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THE RESEARCH REVIEW is published for the employees of the Economic Development Administration and Regional Commissions concerned with economic development as one means of keeping the staffs informed of the nature, results and applications of research into regional problems. Beginning with this issue, THE RESEARCH REVIEW will be published on a regular schedule, once each winter. We trust this publication schedule will improve the usefulness of THE RESEARCH REVIEW to its readers. This publication is prepared by the Office of Economic Research, EDA, Samuel M. Rosenblatt, Director. Suggestions from readers are welcome.

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REGIONAL ECONOMIC MODELS: APPROACHES TO UNDERSTANDING REGIONAL ECONOMIES

*by Wesley H. Long**

Over the past decade or two, as interest in regional development problems has increased, significant amounts of intellectual effort have been directed towards acquiring a better understanding of the fundamental causes of these problems in order to formulate improved policies and programs of regional economic development. One of the principal ways of acquiring a better understanding of something as complex as the functioning of a regional economy is to develop a somewhat simplied model of that economy. The key ingredients that are present, or lacking, in any particular economic system can be highlighted, and hopefully, corrective procedures can be initiated to assist in the accomplishment of some specific economic goals or objectives for that region.

Since its establishment, EDA's Office of Economic Research has participated in this effort through the support of a number of research projects devoted to the development of regional economic models. This article is intended to summarize the approach and findings of a number of these research projects. By so doing it is hoped that not only will greater insight be gained into the workings of the particular regional economies studied but that a greater appreciation of the methodologies used in these models will also be acquired. Once the problems associated with the development of new methods have been encountered and documented and their shortcomings noted, it is hoped that persons wishing to develop similar models for their own regional economies will have the experience of this basic research to guide them.

For discussion purposes the projects summarized in this article have been divided into four groups according to the type of model involved: input-output, econometric, shift-share, and forecasting. Input-output is treated first because its system of economic accounts provides a framework for relating the various types of models to each other.

INPUT-OUTPUT

The name input-output could give rise to pictures of a cook putting ingredients into a dish, mixing them, and taking the finished product out

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* Economist, Office of Economic Research. Charlotte Breckenridge and Samuel Rosenblatt also assisted in the preparation of this article.

again. Essentially that is what input-output studies are about. The dish is an industry, that is a group of factories or other business establishments producing similar goods or services. Finding out the recipe for each of the industries under study occupies a good deal of the time and effort of the researchers involved in input-output work. They may try the direct approach and interview businesses to get lists of expenditures on the goods and services of other industries, or they may try an indirect approach and attempt to use information gathered from governmental and trade publications. The first method is quite expensive and yields fairly reliable information; the second method is less expensive, but yields poorer information.

In either case the researchers arrive at the recipe of each designated industry. This recipe will state that for so many dollars worth of input from all industries the total production (output) will amount to so many dollars for the first industry. Table 1 contains a highly simplified hypothetical example of a country containing just three industries: Agriculture, Manufacturing and Service. In actuality input-output tables usually contain from 40 to 100 or more industrial sectors rather than just three.

TABLE 1

Input-Output Transactions Table for Year Y
for Country X

(millions of dollars)

	PURCHASES							
	Intermediate Demand			Final Demand				Total Demand
Sales	Agriculture	Manufacturing	Service	Households	Government	Buyers of Capital Goods	Foreign Buyers	
Agriculture	21	12	4	35	5	0	3	80
Manufacturing	8	79	11	20	4	8	6	135
Service	5	18	9	9	8	0	1	50

Reading across the rows, it can be seen that the agriculture industry produced $80 million (total demand) for sale to all purchasers. This figure includes goods sold as intermediate products as well as final goods. The former, by accounting definition, are sales to buyers who are not final users of the product, and who, in turn, will resell it. Note also that all industries generally purchase their own output. For example, in addition to the $8 million purchased from manufacturers and the $5 million from the service industry, agricultural establishments also purchased $21 million in output from other agricultural establishments. (Read down the columns).

Once information on purchases is obtained for each industry, the sales made by each industry to every industry are also known. For example, as we have just seen, the manufacturing industry sold $8 million of its output to agriculture. By looking at the purchases of the service industry one can also see how much the manufacturing industry sold to it, ($11 million). In summary, the recipe for an industry is the set of its inputs and its sales are the set of its outputs. When one speaks of an input-output table, it is this information in this or a closely related form that is meant.

Several input-output tables have been constructed for the United States since the idea was conceived and first implemented during the 1930's by Professor Wassily Leontief. The latest national table, prepared by the Office of Business Economics, is for 1963. For areas within the United States the availability of input-output tables is a recent occurrence. EDA has supported three major efforts in this direction: Studies of the State of Washington done by the University of Washington, the State of West Virginia done by West Virginia University, and more recently a study of all States and economic relations among them done by Harvard University. The first two used the technique of directly interviewing businesses within each State, while the third, because of the potentially large cost involved, used the indirect method.

The objective of the Washington State study was to develop techniques for longrun and shortrun forecasting for the State. To accomplish this, the study developed two sets of State input-output tables, one for 1963 and one for 1966, as well as an econometric model of the State. Each of the two sets of input-output tables consists of a variety of methods of treating the information on the receipts of the various industries. Table 2 illustrates one way of treating this information. In this table the hypothetical country of Table 1 is divided into two regions. For the sake of compactness, no sectoral detail is shown for final demand in a region. Assuming that Washington is Region 1 and Region 2 is the rest of the United States, the intrastate transactions correspond to the transactions in the upper left hand corner of Table 2, e.g., the transactions among establishments located in Region 1. Purchases made outside the State by Washington industries are

TABLE 2

Input-Output Transactions Table for Year Y for Country X
Divided into Two Regions

(millions of dollars)

Sales	PURCHASE								Total Demand
	Region 1				Region 2				
	Intermediate Demand			Final	Intermediate Demand			Final	
Region 1	Agri-culture	Manu-facturing	Service	Demand	Agri-culture	Manu-facturing	Service	Demand	
Agriculture	10	2	1	10	5	6	2	24	60
Manufacturing	3	20	2	5	2	4	1	3	40
Service	1	1	1	2	1	5	1	3	15
Region 2									
Agriculture	2	1	0	4	4	3	1	5	20
Manufacturing	2	10	3	10	1	44	5	20	95
Service	2	3	2	3	1	9	5	10	35

shown in the lower left hand corner of Table 2, the purchases of Region 1 made in Region 2. Sales by Washington industries to industries outside the State correspond to the upper right hand corner of Table 2. This portion of the table shows the "exports" Washington industries make to the rest of the country. If tables such as these are available for a State, looking across the rows reveals for each industry the degree to which its sales are dependent on buyers inside and outside the State. Looking down the columns shows the dependence of producers in the state on sellers inside and outside the State. This kind of information can be an aid in industrial development planning.

In addition to information on total dollar transactions, the study also contains data in other forms. One is the number of dollars worth of purchases made directly from each industry in the State per dollar of sales by the given industry. This information corresponds to Table 3 and is derived from the upper left hand portion of Table 2. For example Region 1 - manufacturing has total sales of $40 million. In order to produce this amount it buys $1 million from Region 1 - service industry. Dividing 1 by 40 yields .025, which means that for each dollar of Region 1 - manufacturing output 2½ cents of Region 1 - service industry output is used. Ten dollars would require ten times as much input.

The other form in which the information is presented corresponds to Table 4. This table goes a step further than Table 3, and shows the number of dollars worth of purchases of any input needed not only to produce directly a dollar's worth of an industry's product for sale to final demanders, but also includes the amount necessary to supply the product to other industries who are only indirectly involved.* For example, for manufacturing to increase its output for sale to, say, government, it needs more agricultural goods and more service ($.050 and $0.25 per dollar of output respectively). These are the direct purchases. But also when the agricultural industry produces more output, it, too, requires more services ($.017 per dollar of output) for that operation. Services in turn will need more inputs, etc. Thus an increase in manufacturing output increases the demand for service directly, and, through the increase in the demand for agriculture, indirectly. Table 4 shows that for manufacturing to produce $1 more for sale to final demand will require a total of $2.211 of purchases from manufacturing by all sectors. It should be noted that the amounts within an industry are always greater than $1 because the extra dollar of output is counted itself plus the direct and indirect requirements necessary to supply other industries.

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* This type of table cannot be computed directly as is the case of Table 3, since it requires special mathematical techniques.

TABLE 3

Internal Direct Requirements Table for
Region 1
(dollars per dollar of sales)

	Requirements		
	Agriculture	Manufacturing	Service
Agriculture	.167	.050	.067
Manufacturing	.050	.500	.134
Service	.017	.025	.067

TABLE 4

Internal Direct and Indirect Requirements Table for
Region 1
(dollars per dollar of sales)

	Requirements		
	Agriculture	Manufacturing	Service
Agriculture	1.210	.126	.105
Manufacturing	.116	2.028	.301
Service	.025	.057	1.905

The shortrun and longrun forecasting use of these tables requires forecasts of the level of final demand. The groups designated as the components of final demand are the ultimate generators of economic activity within the State. These groups are the state's consumers, State and local governments, purchasers of capital equipment, and all buyers located outside the State. Using a computer to combine such forecasts with information in the input-output tables will yield a forecast of the amount of production in each industry within the State. If information is also available about how many workers are needed per million dollars of production in each industry a forecast of employment by industry is also possible.

For longterm forecasts of the Washington State economy, such as that for 1980, the necessary final demand forecasts are derived from work done by researchers at other universities and government agencies on projections for the total United States economy. For shorter term forecasts of a year or two, primary use is made of the Washington State econometric model which is designed especially for this purpose, although, to some extent, the sources mentioned above are also used.

Besides outright forecasts these tables are often used for impact studies. The question answered by this type of study is "what would happen if." The "if" could involve a change in the demand for the output of a particular industry for any reason such as a change in plans, policies, legislation, or technology. An examination of the impact of such a change, not only on the industry directly involved, but its ramifications for other sectors of the State's economy is a useful approach for deciding on the specific content of public actions. The "if" also could involve a change in the recipe for a particular industry (1) because of a change in the place (in-State or out-of-State) that purchases are made, (2) because of a new technology which changed the relative amounts of materials used, or (3) because of a change in the State's industrial composition. Again the way in which these changes would ramify through the various sectors of the State's economy is useful information to public and private decision makers.

The Washington State study has been used to examine the expected effects on the State's economy of the recent economic decline in the Seattle area. These investigations are of the impact type mentioned above. Requests for information came from the Department of Defense, the Seattle Area Industrial Council, the Washington State Department of Revenue, and local newspapers. Other uses are a number of investigations undertaken for the Washington State Department of Commerce and Economic Development consisting of short term forecasts for the State and analyses of various sectors of the State's economy. Studies of Puget Sound and the Columbia River basin also have utilized the tables.

As this list of applications indicates, the Washington input-output tables are limited to use in forecasts and investigations for the Washington State economy. However, the methods used to construct the tables are of general application. If one were to attempt an input-output study of another State this study could indicate one way in which to proceed.

There are more sophisticated facets to input-output studies which are more demanding in terms of information and cost. The West Virginia input-output study is an example of one treating the question of technological change and capital investment. This study contains the basic tables illustrated in Tables 1, 3, and 4 that are common to almost any input-output study: the transactions table, the direct requirements table, and the table of direct and indirect requirements. However, imports into and exports out of the State to and from other States are not treated in as much detail as in the Washington State study. In the West Virginia study all that is shown for each State industry is the total purchases and sales outside the State without any detail as to what out-of-State industry was the seller or buyer.

The distinctive table in this study is a table of coefficients of capital investment for expansion and replacement. The expansion coefficients for a given industry are the number of cents worth of capital goods per dollar of annual output purchased within the State for expansion purposes from each other industry. Many of these coefficients are zeros because most industries do not produce capital goods of any kind. In the simple illustrative economy of Table 1, all purchasers of capital goods would buy only from Manufacturing. The replacement coefficients are of the same type only they refer to replacement rather than expansion capital.

With these coefficients, a projection of future output by the State's industries automatically contains within it the assumption that to expand output some increase in capacity is necessary, and this increase itself generates output expansion. Although this is not true in every case such as when idle capacity exists, there is generally a close connection between output increases and capital expansion. When this type of table is missing, as is the usual case, the consistent connection between the way in which output expands and the response of capital goods production, is lost.

The applications made of this model have been of two types: one is called a trend projection, the other a simulation. The trend projection to 1975 is an attempt to trace out trends for West Virginia over 10 years and differs from a forecast for 1975 in that no attempt is made to take account of any business cycles that might occur during the period. The projection thus says this is the way the State's economy will look if expansion is smooth.

Another facet of economic change, beyond capital expansion, also is incorporated in this projection procedure. With the passage of time, the way in which things are produced changes; new technology yields new processes. This means that the recipe of any industry changes. For example, new technology might reduce the need for raw materials in manufacturing so that the requirement dropped from $.050 to $.047 per dollar of output. The usual input-output table contains only the average technology existing in the year for which information is collected. In this study, the assumption is made that the technology used in 1965 by the most advanced firms would be the average technology of all firms in 1975 and that this change in technology would take place regularly over the 10-year period.

Simulations are examinations of alternative outcomes that would arise if changes were to occur in the industrial structure of the economy. The impact of introducing new industries into West Virginia is simulated with the tables by computer methods. The technology of a new industry as it might appear if introduced into West Virginia is added to the tables and the differences between current output by industry and what would happen with the addition of the industry are examined.

The direct applications of this study, like the Washington study, are limited to this one State. However, the techniques developed are generally applicable in the construction of other regional input-output models.

The Harvard study has a much broader geographical scope than the two studies described above. The research involved developed a coordinated set of input-output transactions tables for 44 regions of the United States and the trade relations among these regions. The 44 regions are the District of Columbia, individual States, and a few combinations of adjacent States. For each region there is a 61 industry transaction table and for every pair of regions there are two tables each showing for the 61 industries how much of one region's output is sold in the other. Table 5 contains the figures from Table 2 rearranged to illustrate the form of the Harvard study tables.

There are also transactions tables on an 83-industry basis for all the individual and the District of Columbia. Due to data limitations, however, trade relations among States corresponding to these tables could not be estimated.

The transactions tables for the States in the Harvard study have different information in them than those for Washington and West Virginia. There is no table showing purchases among industries within each State as in Table 2. Instead each State table shows the total purchases made by each State industry from each other industry whether they are bought inside or outside the State. The upper left and lower right corners of Table 5

illustrate this. In effect this table is compiled by adding the internal transactions table for a region to its table of purchases made outside the State. For example, in Table 2, Region 1 agriculture purchases $3 million from Region 1 manufacturing and $2 million from Region 2 manufacturing making the total $5 million in Table 5 for Region 1 agriculture's total purchase from manufacturing nationally.

As explained above because of the limitations on interindustry flows, the transactions tables for trade between regions are limited as shown in Table 5. The sales of each industry in Region 1 made to Region 2 (and vice versa) are shown, but not which industry is the purchaser. Thus the sum of the sales in Table 2 of Region 1 agriculture to Region 2 agriculture ($5), manufacturing ($6), service ($2), and final demand ($24) total $37 million. This figure is shown in Table 5.

TABLE 5

Rearrangement of Transactions Given in Table 2
to Conform to Methods Used in Harvard Study

(millions of dollars)

	Purchases							
	Region 1				Region 2			
Sales	Intermediate Demand			Total Demand	Total Region 2 Purchases from Region 1			
Region 1	Agriculture	Manufacturing	Service					
Agriculture	12	3	1	14	37			
Manufacturing	5	30	5	15	10			
Service	3	4	3	5	10			
Region 2	Total Region 1 Purchases from Region 2				Intermediate Demand			Total Demand
					Agriculture	Manufacturing	Service	
Agriculture	7				9	9	3	29
Manufacturing	25				3	48	6	23
Service	10				2	14	6	13

If the interstate trade flow data are arranged to display all the trade relations for one State, it is possible to see for each industry in the given State which States are the principal markets and which purchase little or none of the given industry's product. Also, it is possible to see which States are the major suppliers of a given State industry's output and which are minor suppliers. If these interstate data are arranged for a given industry to show all interstate transactions, then the whole network of interstate trade is visible for any industry. Inspection of this information will reveal the major markets and suppliers for the given industry.

These visual inspections of the data are able to reveal a good deal of information, but for projections and simulations similar to those done for West Virginia and Washington, computer use is necessary to handle the mass of data involved. One use to which this model has been put is a trend projection of the volume of interstate trade by industry for 1970 and 1980. This exercise is accomplished by making projections of final demand components by State First, final demand estimates by industry for the United States as a whole are obtained from the Bureau of Labor Statistics and other sources. These are then disaggregated by State. Estimates of interstate trade flows for 1970 and 1980 are obtained by using the computer to combine these final demand estimates by state and industry with the direct requirements tables.

Potential uses for this study are simulations examining the interstate impact of proposed policies affecting final demand such as income tax changes or changes in the treatment of investment tax credits. One could estimate the effect of the tax changes by industry and State on the purchases of the final demand sector involved and then by computer combine these estimates with the direct requirements tables to obtain the total output and interstate trade by State and industry. By comparing these results with output and trade in the absence of the policy changes one could see which States and industries within those States were most affected by the proposed policy.

As with any input-output study there are limitations to the use of this one, too. The economic relations within any State are not contained in the State tables, so questions about the full internal effect of an expansion in output for a given industry cannot be answered. The process of technological change is not built into the tables so implicit in any use of the model is the technology of 1963, the year of its data base.

In general there are limitations to the validity of simulations and projections using any input-output model. Two that are often cited will be used as examples. First, the models assume that if prices change, they change by the same proportion for all industries. Thus, a forecast can go

astray if, in the interim, prices in one industry rose by 5 percent and fell in another by 1 percent. Second, the models assume that production methods are the same as in the table at higher or lower levels of output. Thus, a forecast which is predicated on a large output in a particular industry may not be fulfilled because the industry may be able to institute economies of scale at the high level of output so that the purchases from other industries per dollar of output are lower than indicated in the table.

ECONOMETRIC MODELS

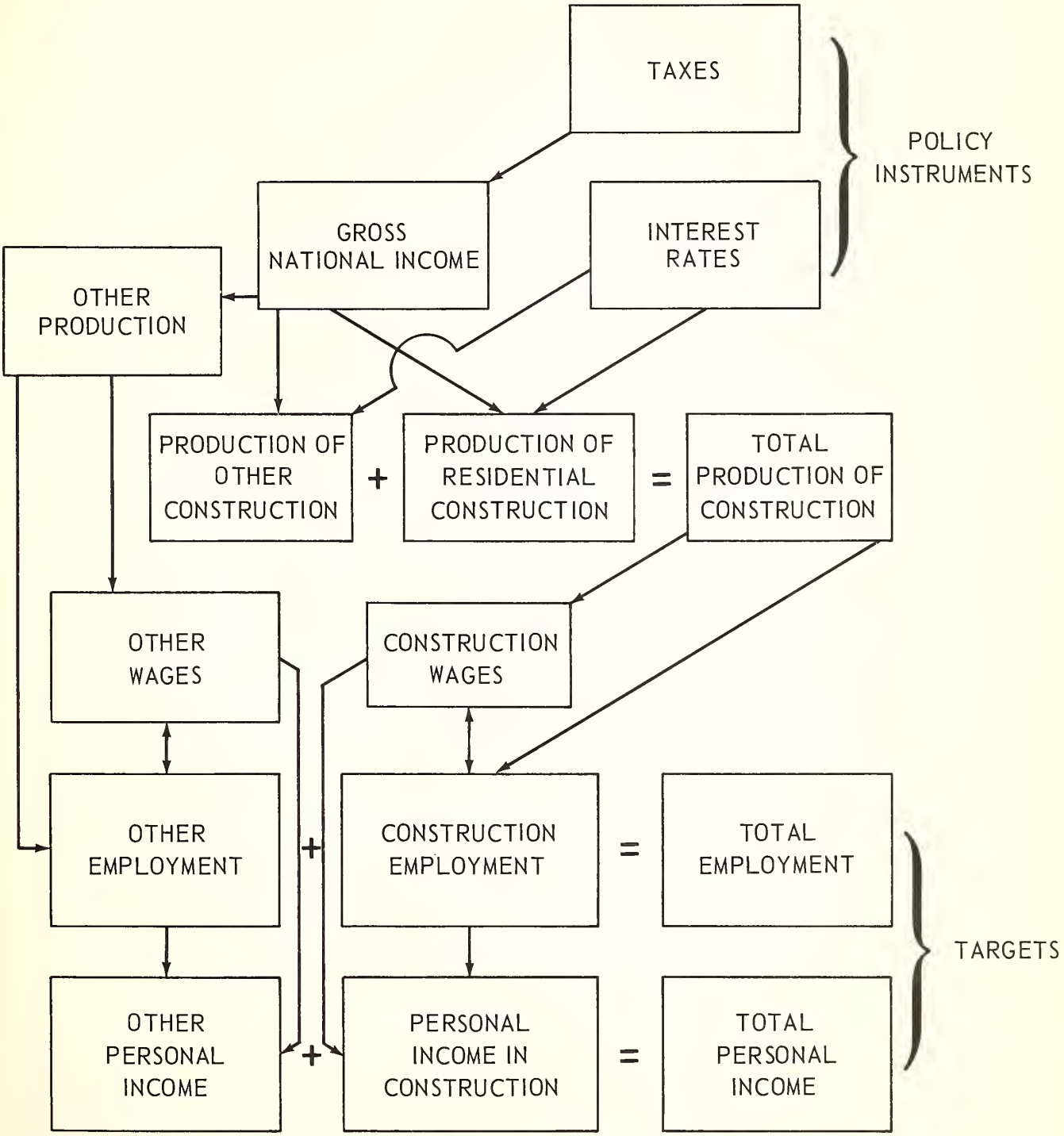
As described above input-output models are not self-contained. In order to be used for forecasting or simulation purposes final demand must be specified from some other source. Econometric models of national or regional economies have the capability to provide estimates of final demand. This type of model is designed to depict as well as possible the complex interrelationships among the economic factors, such as the mutual influence of wages and employment on each other that are crucial to the way in which the economy operates. In addition, if such a model is to be useful for policy purposes, it must encompass the targets that policy attempts to influence, such as employment or per capita income. The model also must contain policy instruments that can be manipulated to affect the targets, for example, taxes, government expenditures, and interest rates. Furthermore, since the private economy is the major producer of income and production, and since it influences and is influenced by the target factors and the policy instruments, this type of activity must be part of the model also.

Constructing such a model means selecting the factors that are to go into it on the basis of economic theory and analysis and then estimating the effects in terms of dollars, percentages, etc., that the factors have on one another. Figure 1 contains a schematic diagram of a simplified example which focuses on residential construction and lumps all other economic activity together as "other." The two policy instruments, interest rates and taxes, both affect residential construction. Interest rates do this directly since they determine the size of mortgage payments, a major determinant of whether or not people decide to have homes built. Taxes have a more indirect effect on such purchases through their effect on disposable income. All other things equal, the higher the level of income, the greater the demand for housing.

Residential construction is part of total construction. The amount of total construction undertaken influences wages and employment in the construction industry. Those in turn are major determinants of personal income earned in construction. And, of course, employment in and personal income

SCHEMATIC EXAMPLE OF AN ECONOMETRIC MODEL

FIGURE 1



from construction are only part, respectively of total employment and total personal income.

Thus, the model is composed of two types of relations. First, those relations among factors that have to do with economic behavior such as the influence of interest rates on residential construction. Each of the arrows in the diagram corresponds to a numerical estimate of some such influence that is in the model. Second, some relations which maintain internal consistency in the model by having totals add up to the sum of their component parts, such as the summation depicted for personal income.

An econometric model funded by EDA is the Coastal Plains model undertaken at the University of North Carolina. This model combines the States of North Carolina, South Carolina, and Georgia into an economic region. The complete States are used because data were not available at that time for the eastern parts of the States corresponding to the Coastal Plains Regional Commission. Data for the years 1949 through 1967 are used to estimate the relations among the economic factors in the region. The model contains 31 relations concerning economic behavior and 17 summation relations.

Given various assumptions about policy instruments this model is designed to forecast or simulate employment, production, and wage and salary personal income levels in the regional economy. Sectoral estimates are provided for agriculture, mining, construction, manufacturing, wholesale and retail trade, finance, insurance and real estate, transportation, communication and public utilities, services, government, and a residual for everything else. For each of these sectors there is a set of relations corresponding to, but more extensive than, those for the construction industry shown in Figure 1. Depending on the particular sector involved, the level of production for these sectors is made to depend on various types of expenditures such as those made within the region by consumers and the military services, and those made in the rest of the United States outside the region. Then, in turn, as in Figure 1, production levels influence wages and employment. These in turn influence income earned. To bring other important economic influences to bear on those described above, the model also contains relations involving nonwage income, social security payments, savings, and net migration between the region and the rest of the country.

As with any economic investigation which attempts to capture the essence of an economic system in a model, numerous difficulties involving data and technical statistical problems are encountered. For example, even though a careful study is made of previous research and economic theory, there is no assurance that the economic factors chosen as the determinants of some target factor will be available as data. If some important data series is not collected, then a substitute must be found and the model is probably

weakened. Moreover, even if there is no problem with the availability of data one can never be absolutely sure that the chosen factors are the correct ones. Some crucial factor may be overlooked or some unnecessary one included. In either case the model is weakened, and forecasts or simulations are apt to stray from the mark.

The construction of the Coastal Plains econometric model presented many of these problems, some of them formidable, and its author is pessimistic concerning its uses for analysis of the Coastal Plains economy. Nevertheless, the model did explore the then extant data for the region. This exploration is a prerequisite for the development of an economic profile of the region and does raise warning signals for policy conclusions.

Shift-Share Analysis

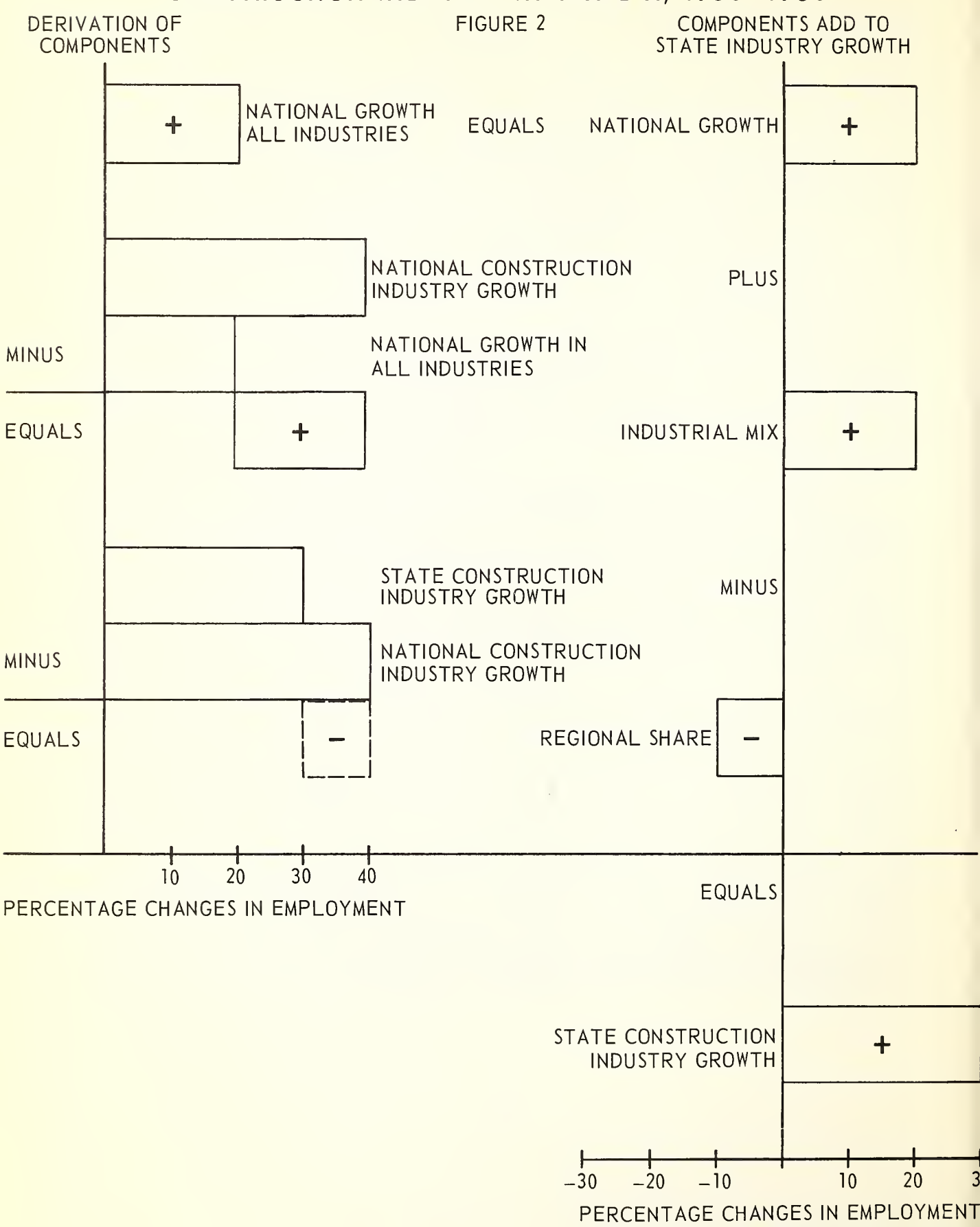
The main features of shift-share analysis, a technique conceived by Daniel Creamer and developed and enlarged by Edgar S. Dunn, Jr., and Lowell D. Ashby, are its use for (1) describing aspects of the processes of growth in regions of the Nation; and (2) projecting likely growth patterns for a given region. The technique is now a conventional tool that is being applied worldwide.

The Regional Economics Division of the Office of Business Economics (OBE), U.S. Department of Commerce, has been collecting data since 1962 in collaboration with the National Bureau of Standards, for systematic shift-share analysis. Sufficient progress has been made so that this tool can now be used (1) to identify the industrial sectors responsible for the higher or lower than average growth rates for different regions of the country, and (2) to evaluate whether there is an overall trend in the pattern of a region's growth over time.

This method of analysis disaggregates the change in some types of economic quantity, such as employment, income, or some other economic measure, into components attributed to the influence of the Nation the industry, and the region. For example, Figure 2 gives an analysis, using hypothetical figures, of the growth rate of the construction industry in a State. Three growth components are identified: (1) National Growth, -- the growth rate that the State construction industry would have achieved if it had grown at the rate experienced by all industries in the Nation combined; (2) Industrial Mix -- the difference between the construction industry growth nationally and National Growth. In the example the construction industry nationally grew faster than all industries combined, so the industrial mix component is positive; and (3) Regional Share -- the difference between the growth of the construction industry in the State and nationally. In the example the component is negative due to the slower growth in the State

COMPONENTS OF CHANGE USING HYPOTHETICAL FIGURES FOR CONSTRUCTION INDUSTRY IN STATE A, 1950–1960

FIGURE 2



than nationally. The sum of the three components adds up to the State construction industry growth rate.

Professor Charles Floyd of the University of Georgia, in a study supported by EDA, has applied this shift-share tool in six studies analyzing employment and income changes in selected regions of the United States during the 1950-1967 period. Five of the regions were the Title V Regions - those having Regional Planning Commissions established under the Public Works and Economic Development Act of 1965: Coastal Plains, Upper Great Lakes, Four Corners, Ozarks, and New England. The last study dealt with the growth of the eight geographic regions of the United States as designated by the Office of Business Economics, compared to the growth of the national economy.

As an example of the use of shift-share analysis for projecting employment change for a region, consider the study projecting employment for 1975 for the Coastal Plains Development Region. The projecting procedure starts with national rates of change of employment by industry derived from projections made available by the Economic Development Administration. Computation of the national growth and industrial mix components for each industry then follow immediately. The national growth component is computed directly as defined above. As shown in Figure 2 the industrial mix component is the difference between national growth and the given industry's growth nationally. The regional share component for the industry is the only one that differs from region to region and cannot be derived from national projections. Two alternative assumptions about this component are made to examine the implications for the region of a continuation of recent trends and a declining trend. The first assumption is that the regional share component of growth will be the same from 1965 to 1975 as it was from 1957 to 1965. The second is that the regional share component for the Coastal Plains region will decline to 75 percent of the 1959-65 rate by 1975.

Adding the assumed regional share component to the projections of the national growth and the industrial mix components then yields the desired projected growth rate for the given industry (in Fig. 2 this is the construction industry) in the region. This process is repeated for each industry thus yielding a projection of the employment by industry for the region.

The resulting projections are not actually forecasts but trend projections similar in nature to those discussed under input-output. The trends for the regions in this case are based on the continuance of national and regional trends and neglect the influence of economic cycles. The questions that can be investigated with these projections are limited by

their nature: given the assumption of continued or declining regional share component and continued national trends what are the implications for the Coastal Plains region in terms of employment growth, industrial structure, average earnings, etc.?

Since the required data on employment and income by industry sector are available from the Office of Business Economics by county, the shift-share analysis as applied by Professor Floyd could be applied to regions composed of any combination of counties. One of the shortcomings of the shift-share technique for analysis is that it does not provide an explanation for the basic reasons for the size of changes in any of the components of regional growth. The technique only identifies the past experience of these components. Missing is any concern with interindustry relations that characterizes input-output or any attempt to relate the components to other areas of economic activity as would be indicated by the econometric approach. Consequently in the projection scheme above, the national growth and industrial mix components are derivations from other sources and the regional share component is the result of an assumption.

A COUNTY FORECASTING MODEL

Up to this point the models discussed have been of standard types. One can describe the input-output approach to model building, the econometric approach, or the shift-share approach, and then relate the general model to the specific research work. The forecasting model in this section is more a hybrid than an example of a general type. It is the work of Professor Curtis Harris of the University of Maryland. This model is based on shift-share analysis. It makes use of relations like an econometric model, but rather than a detailed depiction of the structure of the economy the model employs much broader relations. Frequently it makes use of relations among industries as with an input-output model, but these are selective rather than general. Such an approach is motivated by the lack of detailed data at the county level which makes a strict econometric approach impossible.

The objective of this model is to forecast for States and counties the following economic quantities: population and labor force; employment by industry (50 sectors on the State level, 20 sectors on the county level); personal income and its components (wages, salaries, proprietors income and property income, transfer payments, and contributions for social insurance); and earnings by industry.

This massive task is accomplished by starting with the national fore-

casts obtained from the continuing work of Professor Clopper Almon, Jr. that is concerned with forecasting national input-output tables. The Almon model was selected because it achieves consistency among important parts of the economy and because of its extensive use of economic theory.

Essentially the model estimates the growth of the economic quantities cited above over a decade, in the region as compared to the Nation, that is the regional share as discussed in the previous section. The national growth for the particular economic quantity as forecast by the Almon model is then added to or subtracted from (as the case may be) this regional share to obtain the overall regional growth. For example, the derivation of State construction industry growth is the reverse of the derivation of the regional share in Figure 2. First, the regional share for construction industry employment is estimated from the model, then the Almon model projection of the national construction industry employment growth is subtracted to obtain the desired State construction industry employment growth.

The regional share effects are considered to be measures of regional advantages or disadvantages for attracting industrial growth. Past growth of an industry often explains its future location although the reasons for the past location may have been fortuitous or may no longer exist. Thus there are often stable relationships between the regional share effect of an industry from 1950 through 1959 and from 1940 through 1949.

The regional share effect summarizes a large number of variables that have influenced past location. Proximity to markets or to sources of materials may have been heavily influential in the past, and although either may have shifted, the costs of transportation and production may have been decisive for location decisions. The location of a skilled labor force, market structure, and regional prices, are other factors that may account for different relocation sensitivities.

The estimate of what the county share for any decade will be is derived by relating the actual experience for a given decade, say from 1950 through 1959, to a number of characteristics of the county that influence the particular economic quantity in question. For example, in the case of employment in a particular industry, characteristics such as population, employment in industries that buy substantial amounts from the given industry (thus the similarity to input-output), personal income, and also the actual county share for the previous decade, in this case 1940 through 1949, would be considered relevant and important.

Because areas of large population are both labor and consuming markets, many industries (especially service industries) locate there. In general,

if an industry's location is not restricted by the cost of acquiring material inputs, population centers have the additional advantage of being the location for national transportation and communication networks.

Per capita income is evidence of individual purchasing power and thus can influence the location of industries that sell final products to consumers. Service industries, in particular, may be more closely related to income concentration or growth than to population. Thus personal income, as well as population, is an important determinant of the county share for these industries. In addition some industries are especially sensitive to geographical characteristics and these are taken into account by excluding some regions when particular relations are being derived. Thus, the States are divided into four groups (three coastal and the inland group) for an analysis of the fisheries industry because obviously fisheries differ substantially among regions.

The projection procedure is performed in two stages: first, State projections are derived or allocated from national projections; and secondly, given the State results, allocations to counties within each State are made. Fifty industry sectors are allocated on the State basis, and 20 industry sectors are allocated on the county level. Both sector groupings are exhaustive of U.S. industry.

The model is capable of projections more than one decade into the future. Although historical data are used to make projections, these projections in turn serve as data for further projections. For example, projected regional growth in employment by industry from 1960 to 1970 yields 1970 employment when added to 1960 employment. The derived 1970 projected employment can then be used to determine 1980 employment, and so forth.

Work on regional forecasting is continuing at the Bureau of Business and Economic Research, University of Maryland, in an attempt to make the models more realistic and incorporate more information. This work is under the direction of Professor Harris.

DATA AVAILABLE FROM THE EDA INFORMATION SYSTEMS AND SERVICES DIVISION

The Information Systems and Services Division (ISSD) of EDA has acquired the 1970 Census First Count, File B Summary Tapes, and has converted, with the assistance of the Appalachian Regional Commission, a large segment of this data into Quick Query (QQP) files. This has enabled EDA system users, including reimbursable customers, to begin retrieving First Count Census Data via QQP Forms 1, 2, and 3. ISSD has also ordered the 4th Count, File C, and plans to incorporate a substantial portion of that data into the QQP data base. The Bureau of Census has indicated that the 4th Count, C-files, will be available on a phased basis commencing in late 1971 with completion by mid-1972.

The First Count files contain 55 tabulations consisting of 425 cells of "complete-count" population and housing data. The tabulations can be obtained from the Information Systems and Services Division.

The Census First Count source data are summarized at the State, county, minor civil division or census county division, place, and Congressional District levels. Specifically, four files are being developed: a. a State-County QQP file - now operational; b. a total SMSA QQP File - now operational; c. an SMSA County QQP file - operational date estimated to be October 20; and d. a Place QQP file - operational date estimated to be October 31. The QQP data dictionary for each file is estimated to be October 20; and d. a Place QQP file - operational date estimated to be available October 31. The AAP data dictionary for each file is estimated to be completed by October 31, November 15, November 15, and November 30, respectively. In addition, we plan to augment our existing County Merge file and perhaps one or two other existing QQP files with 70 Census Data.

All EDA organizations have direct access to these data by sending requests through normal channels. All non-EDA components can use the ISSD reimbursement mechanism to retrieve data from these files. Current reimbursement customers should conform to existing arrangements for using the ISSD data base. Others are advised to contact ISSD to set up appropriate interagency agreements, task numbers and other matters. In general, we do not provide programing or query writing services - our customers are obliged to make those arrangements independently.

EDA personnel interested in acquiring either First Count of other data should contact John Milanese, Chief, Applications Development and Data Services Branch. Others should contact either Jack Storm or Aaron Cohen of ISSD to arrange a reimbursement agreement. We are located at 2001 Wisconsin Avenue, N.W. telephone numbers are (IDS) 183-38636, and commercial (202) 343-8636.

Comments and suggestions that may serve to improve the usability of our 1970 Census products are welcome.

EDA's SOCIO-ECONOMIC DATA BASE

For each data source used for creating EDA's socio-economic data base, presented below are (1) place of data acquisition, (2) Entity or entities for which attribute values are provided, (3) Description of data content, (4) File (a) into which data are placed, and (5) Year of next version of data source.

1967, 1962, 1952 County and City Data Book (1) Bureau of Census; (2) State, County, SMSA, City, Urbanized area, Unincorporated urban places; (3) Population and area, Vital statistics, Income, Education, Migration, Civilian labor force, Housing, Bank deposits and savings, Local government, Manufacturing, Retail trade, Wholesale trade, Selected services, Mineral industries, Agriculture, etc., (4) COUNTY.MERGE, COUNTY.PRO, SMSA, CITY, UNINC AREA, and URBAN AREA; (5) 1972.

1960 Census of Population (Social and Economic Characteristics) (1) Bureau of Census; (2) County; (3) Population-General Data, Population-Labor force characteristics, Population-Income, Population-Education, Population-Family and household, Population-Origin; (4) COUNTY.MERGE and COUNTY.60.PC; (5) 1970.

1966 Population Estimates (1) Bureau of Census; (2) County; (3) Population 1966, Population 1960, Population change (1960 to 1966), Births change (1960 to 1966), Deaths change (1960 to 1966), Net migration change (1960 to 1966); (4) COUNTY.MERGE; (5) --

1968, 1967, 1966, 1965, 1964 County Business Patterns (1) Bureau of Census; (2) County by SIC code; (3) Number of employees, Taxable payrolls, Total reporting units, Number of reporting units by employment-size class (1 to 3, 4 to 7, 8 to 19, 20 to 49, 50 to 99, 100 to 249, 250 to 499, and 500 or more persons); (4) COUNTY.BP.XX (5) 1969.

1964, 1959, 1954, 1949 Census of Agriculture (1) Bureau of Census is prime

source, but data was acquired from the Department of Agriculture; (2) County; (3) Farm acreages and values; Number of farms by size, type economic class; Value of farm products old, Farm operators, Income from sources other than farm operated, Persons in farm operator households, Land farms by use, Irrigation practices, Land use practices, Equipment and facilities, Farm expenditures, Fertilizers, Use of lime, Use of sprays and dusts, Poultry and livestock, Dairy products, Crops harvested, Tree fruits Nursery and green house products, Forest products; (4) 64.AGR.TOT, 64.AGR.SUB, 59.AGR. SUB, 54.AGR.SUB, 49.AGR.SUB; (5) 1969.

1963, 1958 Location of Manufacturing Plants (1) Bureau of Census; (2) County by SIC code; (3) Number of plants by employment-size class (-19, 20-49, 50-99, 100-249, 250-499, 500-999, and 1000 or more persons); (4) XX.LOC.MFG; (5) 1967.

Harris Economic Projections (1) Curtis C. Harris Associates, Inc; (2) County; (3) 1950, 1960, 1970 and 1975 employment by 21 industries and 1960, 1970 and 1957 employment by 20 occupations; (4) Harris File (Not in QQP format); (5) --

1968, 1967 Minority Employment (1) Equal Employment Opportunity Commission; (2) Business establishments by County, SMSA, State, Region, and SIC code; (3) Number of employees by male and female for total employment and for each of four minority groups (Negro, Oriental, American Indian, and Spanish American) by various categories of employment (Officers managers, Professionals, Technicians, Sales workers, Office and clerical, Craftsman, Operatives, Laborers, and Service workers); (4) 1967 EEOC FILE, 67.EEOC.REG, 67.EEOC.GEO, 67.EEOC.SIC, 67.EEOC.SMSA, and 67.EEOC.2.SIC and corresponding 1968 files; (5) 1969.

1968*, 1967, 1966, 1965, 1964, 1963, 1962, 1961 F. W. Dodge Construction Statistics (1) F. W. Dodge Company; (2) County; (3) Number of projects, Floor space of projects, and Value of projects by (a) 95 types of residential and nonresidential construction based upon Dodge 2-digit codes; (b) 119 types of industrial construction based upon Dodge 3-digit codes, and (c) 148 types of building and nonbuilding construction based upon Dodge 3-digit codes not included in the industrial file; (4) DODGE.2. DIGIT, DODG.3.IND, DODG.3.OTHER: (5) 1969.

1969, 1968, 1967, 1966, 1965, 1962, 1959, 1950, 1940, 1929 Income (1) Office of Business Economics; (2) County (for non-SMSA counties) and SMSA; (3) Total personal income and its component parts (Total wage and

* Data tapes for 1968 Dodge Construction Statisitics acquired but not incorporated into system to date.

salary disbursements, Other labor income, Proprietors income, Property income, Transfer payments, and Personal contributions for social insurance), Total earnings and its component parts (Farm earnings and Total nonfarm earnings, the latter being broken down into Government earnings and Private nonfarm earnings as well as various categories under each), and per capita personal income; (4) INCOME, SMSA.INCOME, AND PR.CAP.INCOME; (5) 1969.

1969, 1968, 1967, 1966, 1965, Labor Statistics (1) Department of Labor; (2) EDA area; (3) Unemployment data and work force data; (4) GEO.DATA.MTR; (5) 1969.

Multi-Regional Input/Output data (1) Harvard University; (2) State by industrial classification and region by industrial classification; (3) Payroll dollars, Number employed, and Dollar outputs for 1947, 1958, and 1963; Personal consumption expenditures, Gross private capital formation dollars, Dollar net inventory change, Dollar gross exports, Dollar purchases by Federal government, and Dollar purchases by State and local governments for 1947, 1958, and 1963 and projected for 1970 and 1980; Regional input/output dollars and dollar inter-regional tradeflows for 1963; Regional output dollars and inter-regional tradeflows projected for 1970 and 1980; Dollar exports by port of exit and dollar competitive imports by port of entry for 1963; and dollar purchases as inputs to construction industry for 1963, 1958, and 1947; (4) HO1 and HO2; (5) --

DESCRIPTION
OF
RESEARCH AND TRAINING PROJECTS

REGIONAL ECONOMIC STRUCTURES AND RELATIONSHIPS

STUDIES IN URBAN DEVELOPMENT

Performing Organization:	University of California, Berkeley	Monitoring Agency:	EDA - Office of Economic Research
Principal Investigator:	William Alonso	Project No.	99-7-13106.1

Objectives and Procedures: This research focuses on the development of the system of American cities, attempting to relate theoretical analysis and empirical findings to policy issues. The studies under this program query theory and experience with growth poles, patterns of migration, complex issues of city size, and relation of the depressed hinterlands to systems of urban centers.

During the current year, plans are to concentrate on completion of the simulation model of the U. S. metropolitan area system, employing it to project emerging growth trends and test policy alternatives such as maximizing personal income, minimizing interregional differences, and the types and amounts of subsidy needed to sustain growth in lagging regions. Emerging as well as older metropolitan areas are studied with reference to their impact on patterns of urbanization. Analysis of the social and environmental, as well as economic, aspects of the correlates of urban size may be explored. The role of smaller metropolitan areas as centers for growth in population and economic activity within megapolitan areas will be examined, as will welfare and economic impacts on the populace of declining areas.

Current Developments: A brief description of an illustrative model and some tentative and qualified conclusions concerning the implications of this research to date are incorporated in the recently received working paper, "The System of Intermetropolitan Population Flows." The paper points to the declining importance of foreign and nonmetropolitan migration, as well as natural increase, in the growth of metropolitan areas. This explains the significance of a focus upon migration among

metropolitan areas as the factor through which to examine the evolution of the demographic structure of the metropolitan system.

Two additional papers were received from William Alonso: "The Economics of Consumption, Daily Life, and Urban Form" and "Urban Growth in California: New Towns and Other Policy Alternatives."

Status: This grant has been funded through February 1972.

RESEARCH IN REGIONAL DEVELOPMENT PROCESSES AND POLICIES

Performing Organization:	The University of Chicago Center for Urban Studies	Monitoring Agency:	EDA - Office of Economic Research
Principal Investigator:	Brian J. L. Berry	Project No.	99-7-13010.3

Objectives and Procedures: This study by the Center for Urban Studies is designed to utilize the 1970 census data for bringing up to date the national definition of the U.S. urban hierarchy, urban gradients and growth centers, materials on urban structure, and areas of urban influence. It is also designed to complete a previously initiated study of industrial decentralization potentials. The first task updates Professor Berry's work for the U.S. Bureau of the Budget to map out the labor markets of cities in the U.S. The second task will document the nature, extent, and implications for peripheral and small town industrialization of industrial diffusion trends in the U.S., 1960-1970, and will also attempt to explain why what happened did, and formalize a model replicating the process.

The adequacy of the study of growth potentials of urban places described in the third task above will be limited by the fact that requisite socio-economic data for the period 1960-1970 have not yet been provided by the U.S. Bureau of the Census from the 1970 census. Clearly, the completeness and thoroughness of the work on influence and spread effects of urban places must be predicated upon the availability and incorporation of such data into the hierarchical system if a national growth center framework is to be useful in the years ahead. Similarly, the work accomplished in the initiated study is only a beginning, but it is clear that a systematic study of industrial diffusion potentials can be a powerful supplement to laying out a nationwide system of growth centers.

Current Developments: This study continues support of previous work at the University of Chicago. Considerable progress has been made in identifying a national urban hierarchy showing the relationship among urban areas and the relationship of each urban place to its hinterlands. During this past year further work on these problems was undertaken and three tasks were completed with final reports recently received. The completed tasks include: an analysis of the relationships between migration, income, and employment opportunity in the U.S. 1950-1960; a study of the multiplier effects of employment expansion on regional income, examining such issues as the source and stability of growth; and a study describing the influence of each urban center that exerts spread effects upon its

hinterlands and an examination of the effects of location and size on the growth prospects of potential growth centers.

Status: The Center for Urban Studies is scheduled to complete the above tasks by June 1972.

RESEARCH ON REGIONAL ECONOMIC DEVELOPMENT

Performing Organization:	The George Washington University	Monitoring Agency:	EDA - Office of Economic Research
Principal Investigator:	Charles T. Stewart	Project No.	99-7-13206

Objectives and Procedures: This study is designed to provide EDA with a quantitative analysis which will depict the magnitude of linkages between small SMSA's and their hinterlands. Recent empirical evidence is being used to determine whether regional growth centers can alleviate the problems of large metropolitan area congestion and arrest the depopulation of rural areas. The effort is expected to prove valuable to the formulation of any national policy affecting population distribution and EDA strategy regarding the location of growth centers.

Specifically the research will examine the spatial dimension of economic growth of metropolitan areas between 50,000 and 250,000 population. Eighty-six Rand-McNally Basic Trading Areas represent the geographic scope of this study. These areas will be classified by growth rates in population, employment, per capita income, and by industry sectors. The relationship between the growth performance of the metropolitan areas and nearby counties will be examined in terms of commuting, migration, and trading patterns.

Current Developments: The methodology for the analysis has been completed. A tape record of data series and regressions from EDA's Information Systems and Services Division has been delivered to the grantee for analysis. Migration, commuting, and per capita income data from the Office of Business Economics has been received and a preliminary draft of analysis of findings on migration has been prepared. Preliminary drafts of the first three chapters of the final report have also been prepared.

Status of Project: Expected date of completion is early 1972.

PROGRAM ON REGIONAL AND URBAN ECONOMICS

Performing Organization:	Harvard University	Monitoring Agency:	EDA - Office of Economic Research
Principal Investigator:	John F. Kain	Project No.	99-7-13223

Objectives and Procedures: Harvard University's Program on Regional and Urban Economics has been supported by EDA for the past 5 years. During this period a wide range of subjects has been studies. This includes regional and urban industrial location, economic decentralization within metropolitan areas, determinants of interregional migration, including the problems of, and alternatives to, extensive migration to inner-city ghettos, inner-city economic development, Southern rural poverty and Southern economic development, relationship between metropolitan housing market segregation and the distribution and level of minority employment, and interregional capital movements. Preliminary estimates of the initial level of income transfers inherent in the proposed family assistance plan and estimates of migration shifts based upon previous trends, for the South and the rest of the Nation have been completed. A survey text on regional economics is scheduled for publication in late 1971.

EDA research support this year is primarily aimed at broadening the scope of previous inquiry. The areas of research include: (1) analysis of the costs of migration, which may be compared with the benefits derived from inmigration experience; (2) completion of an analysis of the dynamics of industrial location of selected manufacturing industries within the Boston metropolitan area, particularly the effects of location on the spatial structure of the metropolitan area; (3) an analysis of the market for vacant industrial land within the Boston metropolitan area; (4) the process of capital and wealth accumulation among blacks, relating this to the development of a national strategy for urban development; and (5) a cost-benefit analysis to evaluate Canadian experience with subsidies to firms in depressed areas.

The training component of the program has resulted in 12 completed doctoral dissertations. Enrollment in undergraduate and graduate courses has totaled nearly 400. This year the training program includes: (1) a year graduate course in urban and regional economics; (2) two single semester undergraduate courses, one in regional and the other in urban economics; (3) two single semester seminar workshops, which will, following past precedent, provide for the exchange and presentation of

relevant research fundings by faculty and students.

Current Developments: During the first 5 months of this renewed grant the following papers have been received:

- "Migration as Investment: Some Further Considerations" by William C. Apgar, Jr.
- "Regional Differences in the Structure of Earnings" by Eric A. Hanushek
- "Regional Impacts of the Family Assistance Plan" by John F. Kain and Robert Schafer

In the latter paper, the authors develop estimates of the regional impact of various levels of proposed family assistance plan programs. These estimates provide an initial evaluation of the differential regional effects of this type of program. They are perhaps the only regional estimates, completed to date, which include attempts to quantify both regional income and migration effects.

Kain and Shafer find that a family assistance plan providing a $1,600 annual income to a family of four with no other income would cost the Federal Government $4 billion. Of this amount more than half would be transferred to the South. The net redistribution to the South, subtracting out Federal taxes paid and assuming continuation of the South's relative share of these taxes, is estimated at almost $1.4 billion. This would lead to an estimated growth in aggregate Southern regional income of $3.5 billion -- nearly 2 percent of 1969 personal income for the South. For portions of the South where per capita incomes are lowest (South Carolina, Georgia, Alabama, Mississippi), aggregate income growth is estimated at 4 percent.

Current proposed legislation includes an income floor of $2,400 for a family of four. Additional estimates by Kain and Shafer on hypothetical plans of $1,920 and $3,000 for a family of four result in suggested aggregate Southern regional income increases of $5.0 billion and $9.2 billion respectively.

The authors conclude that the effect of these programs upon South-non-South migration will be modest. These analyses suggest that the institution of a family assistance plan would have a larger impact on white net migration than on black, that black migration from the South to northern metropolitan areas might be somewhat reduced, and the net white inmigration to the South evident during the past decade would be accelerated.

Status: Project is funded through June 1972.

THE SERVICE SECTOR AS A FACTOR IN THE ECONOMIC GROWTH OF NEW ENGLAND

Performing Organization: Arthur D. Little, Inc. Cambridge, Massachusetts

Monitoring Agency: New England Regional Commission

Project No. 99-8-00084

Objectives and Procedures: Earlier studies had revealed that the service industry sector of the New England economy had been the region's most rapidly growing major employment generator. The New England Regional Commission, as part of its mission to foster employment growth in the region, authorized this study to identify the components of the broad service industry which are most likely to undergo rapid expansion by 1980. This information would help the Commission develop actionable guidelines for future policies and programs aimed at manpower development programs. In particular, the extent to which service sector growth could be directed into growth centers in the outlying areas of the region, could be explained.

Current Developments: In addition to providing statistical projections of service industry growth to 1975 and 1980, the report analyzes factors which may affect growth in the principal service industries subsectors. Since the service industries encompass a wide variety of diverse activities, the researchers focus their attention upon the groups which have shown the greatest growth: medical and health services, education services, and business services. Profiles of these industries are developed and policy guidelines for the Commission's consideration are presented.

Approximately 370,000 jobs will be generated by the service industries in New England between 1967 and 1980. Miscellaneous business services and medical health services are each projected to require 100,000 new jobs; educational services, 40,000 jobs; nonprofit membership organizations, 47,000 jobs; hotels and other lodging places, 24,000 jobs and all other services, 54,000 jobs. Some 114,000 of these jobs are expected to be at the "entry" level occupations.

Service activities are more susceptible to growth in one geographic area than another. As expected, major metropolitan centers such as Boston have special characteristics and advantages as medical and educational centers and parts of northern New England and Cape Cod have special advantages as tourist and recreational centers. Distinct development strategies are presented with reference to each of the three major service sectors.

The report is organized into three parts:

Chapter I - Overall Conclusions and Recommendations

Chapters II - IV - Profiles of the Medical, Educational and Business Services

Chapter V - The New England Service Industry Employment Structure, Description, and Data

Status: The final report was prepared April 1971 and is available.

RESEARCH ON REGIONAL ECONOMIC DEVELOPMENT IN THE SOUTHEAST

Performing Organization:	University of North Carolina	Monitoring Agency:	EDA - Office of Economic Research
Principal Investigator:	Professor C. H. Kreps, Jr.	Project No.	99-7-13218

Objectives and Procedures: The Southeast contains a high proportion of the nation's low income counties and is therefore a region of major concern to the Economic Development Administration. This grant, administered by the new Institute of Applied Business and Economic Research, (Director: Professor Clifton H. Kreps, Jr.), will provide assistance to prominent scholars located throughout the South to undertake research on topics indigenous to the South. This approach is expected to identify more appropriate and relevant research into economic development problems in this region.

Current Developments: Efforts have been underway to encourage the development of research proposals appropriate for funding under this grant. To date four research proposals have been approved and several others are under consideration. The approved research proposals are:

1. Physicians, Hospitals and The Demand for Health Care Services in Southeastern U.S. - by Richard F. Wacht, Georgia State University

2. Analysis of Methods Used in Raising Equity Capital in a Developing Region - by J. Van Fenstermaker, University of Mississippi

3. Optimization of Price Levels and Market Availability of Insurance Coverages in North Carolina - by Joseph Finley Lee, Jr., University of North Carolina

4. Impact of Investment of State Funds Upon Money and Capital Markets and Economy Within the State of Tennessee - by Harry L. Johnson, University of Tennessee

Status: The four approved research proposals have been funded and the researchers have started on their projects. Efforts are continuing to select appropriate additional research topics and researchers to expand this project which is now funded through June 1972.

THE ROLE OF GROWTH CENTERS IN REGIONAL DEVELOPMENT POLICY

Performing Organization:	University of Texas	Monitoring Agency:	EDA - Office of Economic Research
Principal Investigator:	Niles Hansen	Project No.	99-7-13203

Objectives and Procedures: The research focuses on the development of a growth center strategy for accelerating economic development of lagging areas in the United States, with emphasis on relating the theoretical, empirical and analytical findings to policy issues. The grant complements and brings to a completion the program initiated under OER Grant (99-7-13156) to the University of Kentucky.

Current Developments: Results of research on a variety of subjects related to the general grant theme are described in these recently received papers:

"Toward an Improved Labor Relocations Program: Evaluating the Foreign and Domestic Experience," by N. Dann Milne. -- A continuous labor relocation program could fill an important gap in the totality of employment services needed by the American worker. Currently, says Mr. Milne, there is no mechanism in the United States to aid workers in areas where there are no employment opportunities to move to areas where there are such opportunities. Poor job information dissemination, or lack of funds to cover moving expenses (because of lengthy unemployment) will immobilize an unemployed worker in an area where no employment opportunities exist for him. A general description is provided of worker relocation programs in Great Britain and Sweden as well as of recent American experience funded under the 1963 and 1966 amendments to the Manpower Development and Training Act. A detailed examination of three Kentucky pilot projects is presented in order to provide insights into how relocation projects operate. Recommendations for future programs are drawn from these Kentucky experiments. These are: (1) coordination of a program of "outreach" so as to recruit unemployed workers with special emphasis on disadvantaged groups in areas that offer few employment prospects; (2) upgrading skill and education levels of the relocatee, (retraining and relocation should complement each other!); (3) provision of assistance in moving and finding suitable housing; (4) computerization of job information networks; and (5) centering program responsibility in the State employment services, with a corresponding expansion of their functions. It is concluded that workers need to be relocated in areas of high employment demand, first, because

it makes the program easier, and second because it increases the probability of finding a second job if dissatisfied with or fired from the initial job.

"External Economies and Regional Development Theory," by Manley E. Staley. -- This paper is concerned with two theoretical inquiries. The first deals with external economies. Definitional problems are raised and the viewpoints of major writers, Alfred Weber, Phillippe Aydalot, Tibor Scitovsky, Paul Rosenstein-Rodan, H. Arndt and Ragnar Nurske are presented. Although no clear cut agreement exists, most scholars today support the notion that the concept of external economies is more than cost reduction caused by the interaction of firms, but that everything from the prestige and social life of a city to the taxation policy of a government can be considered as creators of external economies.

The second inquiry is directed to the roles that this concept plays in development theory. Several traditional development theories are reviewed: Paul Rosenstein-Rodan, Albert Hirschman, and Edgar Hoover. An extensive discussion of the "polarization" theory of French scholars, particularly of Francois Perroux and Jean Paelinck is presented, as is the agglomeration phenomenon of P. Aydalot and M. Marcus. Mr. Staley summarizes that there are three major roles of external economies in development theory. These are to explain barriers to growth, as a mode of transmission, and as motivation for agglomeration. It is concluded that the existence of external economies is a necessary but not a sufficient condition for growth. Someone may have to intervene to get investments started, and that someone will probably be the public sector.

"Reservation Development Versus Migration: A Study of the Locational Preferences of Indian High School Seniors in the Southwest," by Niles Hansen. -- It is widely maintained that Indians are particularly reluctant to leave their native habitat in search of better opportunities elsewhere, and that when they do their destinations are likely to be big city slums. This study attempts to test this thesis by providing some evidence about the locational preferences of young people from the Navaho, Zuni, and Rio Grande Pueblo tribes. The methodology used was the survey questionnaire. Because of their relatively high mobility potential, only high school seniors of these tribes were queried. The study examines their preferences in light of differing wage rate assumptions in (1) the present community of residence (the reservation), (2) intermediate-sized city (Albuquerque and Denver), and (3) large city (Chicago, Los Angeles, or San Francisco). The findings indicate that Indian high school seniors are willing to leave the reservation in

response to small wage differentials, wherever paid. Dr. Hansen emphasizes that the number of respondents preferring and expecting to remain on the reservation is so small that the future survival of the tribes, at least in a geographically localized place, seems highly questionable. This is particularly striking, notes Hansen, in view of the fact that the tribes concerned are considered to be among the more successful in the Nation in achieving a stable reconciliation of traditional values with those of the larger society. The study concludes with the observation that if the Indian populations are to be given a greater opportunity to participate equally in national economic progress, sentiment about reservation life should not obscure the fact that matching of workers and jobs demands a broader geographic perspective. Such a perspective should place much more emphasis on investment in human resources and on job opportunities in intermediate-sized cities than has heretofore been the case.

"The Industrial Ecology of Small and Intermediate-Sized Technical Companies: Implications for Regional Economic Development," by Cary Hoffman. -- This paper describes the minimum requirements necessary for the development, growth and survival of small and medium-sized technical companies in a local area. A body of information concerning location-associated factors is developed. A survey of 115 firms (three-fourths employing fewer than 100 employees) located in San Francisco Bay area, Minneapolis-St. Paul, Dallas-Fort Worth, surburban Washington, D.C., Chicago, Cleveland, Oklahoma City, and Tulsa was undertaken. The paper identifies and examines the following factors as "highly important" or "critical" to the operations of technical companies of the size studied: (1) availability of commercial airline service, (2) availability of leasable facilities, (3) an urban environment, (4) a local university offering engineering and science graduate courses, (5) good primary and secondary educational facilities, (6) adequate trucking service, and (7) a vocational technical training school. Analyses of survey results support these findings: • Certain kinds of technical companies are no more "footloose" than most manufacturing industries. Commercial testing laboratories and precision-machined products fall into this category. • On the other hand, some high-technology industries are locationally independent, only if a number of supporting services and facilities are already available in the area. These industries include mechanical and electronic instruments, electronic systems, pharmaceuticals, electronic components, and high specification mechanical devices. Because many companies in these industries serve national and international markets, the area's infrastructure must support their location. To encourage technical firms to locate in their area, the following recommendations are offered to State, regional and local authorities. • Offer facilities on a long term lease basis.

o Make certain that commercial loan officers increase their knowledge and familiarity with the particular financial characteristics of small technical firms. • Increase the number and variety of technical material available by encouraging technical companies and manufacturers' representatives to warehouse items in the area. • Increase the availability of airline services. • Identify machinery, plating, testing, and printing facilities located within the area that can service high-technology companies. • Encourage technical/vocational centers.

"Migration Centers, Growth Centers and Regional Commissions: An Analysis of Expected Future Lifetime Income Gains to Migrants from Lagging Regions," by Niles Hansen. -- In this manuscript, Dr. Hansen examines the extent to which migration centers are, in fact, growth centers. Migration centers are identified as SMSA's that are doing most in relation to their own size to increase lifetime income of migrants from distressed areas. While the author supports regional legislation calling for a growth center strategy to benefit disadvantaged people, its narrow geographic focus precludes the selection of the most relevant growth centers. The migration data presented in this study were obtained from the 1-percent Social Security sample. The Social Security Administration maintains an annual sample on magnetic tape, and because the same numbers are selected each year it is possible to establish a work history file for all those who worked in a given period and determine their socio economic characteristics for prior and subsequent years. This information has been made operational by the Office of Business Economics. To calculate the migrant's expected future lifetime income increase in relation to size of migration center, a statistical model was developed which depends on the use of the detailed information about the individual attributes of the migrant as revealed in the 1-percent Social Security sample. A ranking index for the 15 highest-ranking SMSA's (migration centers) in the Appalachian, Ozarks, Four Corners, Coastal Plains, and Upper Great Lakes Regional Commission areas is presented. Next a frequency distribution by population-size class of the 75 migration centers and a spatial distribution of the centers between regional commission and nonregional commission areas of States that have regional commission areas are presented in the context of an analytical discussion that these places should be people serving. The results of this analysis lend support to the following policy considerations: (1) The most efficient migration centers -- in terms of increasing the incomes of migrants from lagging areas -- tend to be outside of the lagging areas but not big, distant cities. They tend to be growth centers in the nonregional commission portions of relevant States. (2) The current regional commission approach of working primarily within lagging portions of States is not economically efficient, at least insofar as policy is concerned with

individual welfare rather than places. (3) A regional commission approach should be based on whole States, and planning should be at the state level. The problems of people in lagging regions need to be dealt with in a larger geographic perspective than the lagging regions themselves. (4) While Federal policies based on growth centers and comprehensive relocation assistance could build on existing migration patterns in regional commission States, the Appalachian case calls for greater efforts to redirect migration streams in favor of "outside" growth centers, for the longrun prospects of the Appalachian centers is often at best declining or stagnant.

"The Economic Impact of an Airport," by Richard Peoples. -- The paper re-examines the findings of a recent airport impact study of the North Central Texas area made by the Regional Science Research Institute (RSRI). RSRI's methodology and calculations for determining direct and secondary impacts to 1975 of employment, wages and salaries, output of tenant activities, air carrier and cargo handling operations, and direct and indirect purchases are presented. Results indicate a high secondary impact. The importance of the location decision and the interdependence of different types of variables involved in making that locational choice are also discussed. However, the optimal site is frequently not the one chosen. It is noted that when economic and noneconomic (ecological, political and social) considerations are at odds, the outcome is frequently in favor of the latter.

Other completed papers received are:

"Indian Migration and Assimilation," by Robert Weinstein
"Mathematical Models for Regional Planning," by David Kendrick
"Underdeveloped Regions in a Historical Framework," by Robert D. Tollen
"The International Boundary Between the United States and Mexico: Its Influence on Some Problems of Economic Development and on Development of Economic Policy for Adjacent U.S. Regions," by William C. Gruben
"Chi-Square Tests on the Relationship Between Superhighways and Economic Activity," by Patricia A. Malin
"A Model for Housing Analysis," by James F. Courtney

Status: A final report containing the major findings from 3 years of research under grants to the Universities of Texas and Kentucky, along with recommendations for an agency and national growth center strategy, is expected in early 1972.

MULTIREGIONAL INPUT-OUTPUT

Performing Organization:	Office of Business Economics	Monitoring Agency:	EDA - Office of Economic Research
Principal Investigator:	Interindustry Economics Division	Project No.	99-7-13209

Objectives and Procedures: The purpose of this effort is to implement the Multiregional Input-Output Model of the United States developed by Harvard University under a previous contract with EDA.* The data produced by Harvard are being examined for economic and internal accounting consistency. At the same time a set of computer programs is being developed to allow updating of the data base, retrieval of data for distribution to users, and analytical use by EDA.

Current Developments: Several consistency checks and analytical procedures have been examined. The basic computer program needed for analytical use of the model has been verified.

Status: The project is scheduled for completion in June 1972.

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* See The Research Review, June 1971, pp. 1 - 7.

ESTIMATES OF PERSONAL INCOME AND EMPLOYMENT BY COUNTY

Performing Organization:	Regional Economics Division Office of Business Economics	Monitoring Agency:	EDA - Office of Economic Research
Principal Investigator:	Edwin J. Coleman	Project No.	99-7-13130

Objectives and Procedures: Since 1967, EDA has provided continuing support to the Office of Business Economics for development and annual updating of a continuing series of economic information useful for area planning and analysis. This package of information includes estimates of personal income, by type and industrial source, and per capita income estimates for substantially all counties of the United States. In addition, estimates of total employment consistent with and comparable to the estimates of personal income are being developed for the first time.

Estimates of income and employment will enable further analysis of area and industrial structure for groups of counties and for broad regions.

Current Developments: The current EDA support will update the income series to 1970. Estimates of personal income on an annual basis are available since 1965 with selected year coverage going back to 1929. Revisions in geographic boundaries (e.g., SMSA's) incorporated in the 1970 estimates will require adjustments in estimates for earlier years to insure comparability in the data series. Listings and tabulations of 1929 to 1970 personal income by all counties and for economic development districts are anticipated by June 1972. A tape record of these data will also be received at that time to enable EDA to prepare special tabulations, as required.

Preliminary estimates of annual average employment from 1967 to 1969 have been prepared. Listings by county and EDA development districts provide estimates of the number of proprietors and wage and salary employment in the farm and nonfarm sectors. Broad industry detail is also available.

Status of Project: The work is funded through June 1972.

INTERREGIONAL MIGRATION DATA

Performing Organization:	Regional Economics Div. Office of Business Economics (OBE)	Monitoring Agency:	EDA - Office of Economic Research
Principal Investigator:	David Hirschberg	Project No.	99-7-13180

Objectives and Procedures: The Regional Economics Division of OBE has made operational the Social Security 1-percent sample file (continuous work history sample) of persons with Social Security account numbers. This file is updated annually and currently covers the period 1960 to 1967 with first quarter 1970 records currently being processed.

Data records included in the sample file include the following for each account number: age, sex, race, industry, place of work and earnings. From these records analysis can be made of the components of the labor force remaining in particular areas and those which have migrated (movers to and from the area). Population movements and their effects can be identified by matching identical account numbers over the time periods covered by these records and estimates made of the comparative performances of the movers and nonmovers. Origin and destination studies to identify migration streams are also feasible.

The funding provided to OBE will provide EDA with special tabulations in support of studies of the EDA development district program as well as overall program planning and allied research.

Status of Project: This project is funded through June 1972.

COMPOSITE MAPPING SYSTEM (CMS)

Performing Organization:	North American Rockwell Information Systems Co.	Monitoring Agency:	EDA - Office of Planning and Program Support
Principal Investigators:	Gary G. Slack, NARISCO Ute Bergfried, NARISCO John B. Fieser, EDA	Project No.	99-7-13205

Objectives and Procedures: The purpose of this project was to provide program documentation of the EDA Composite Mapping System (CMS) and to perform interim CMS testing and program maintenance support. Technical documentation was required by the EDA Information Systems and Services Division for implementing the desired capability of in-house maintenance and modification of CMS. Contracted testing and program maintenance was required to debug CMS and bring it to an operational status after development of the basic program by the Consolidated Analysis Centers, Inc. (CACI).

Project Developments: System documentation was reviewed by the Information Systems and Services Division and was subsequently accepted. Documentation is divided into three main categories: System Design; Programing Information; and System Operation. The documentation has been tested and found to be well organized and concise.

Testing and maintenance of those subprograms not receiving such attention under the previous program development contract, for reasons of contract limitations, were accomplished concurrently with the writing of the technical documentation. During the period of March to September 1971 extensive testing, problem isolation and corrective system maintenance was performed. By the time of contract completion and to the present, the Composite Mapping System was performing all mapping operations with a complete absence of program-caused malfunctions.

In addition to previous primary mapping capabilities of free-form and county-conversion display, and differentially-weighted compositing, the most important of many new CMS capabilities is that of directly and automatically relating to the EDA data base of socio-economic information, as well as with other data tapes of known format. CMS can thereby produce statistical surface maps, by county or selected areas aggregated thereof, with minimal human intervention and preparation time. This important capability gives rapid access to an essentially limitless body of data and allows the researcher to see the display of areal differentiation or spatial trends in as close to "real time" as possible.

It thereby eliminates a disruption of analysis often caused by the normally slow preparation of mapped information.

Status: Program testing and maintenance were completed, and technical documentation was accepted in September 1971.

THE MUNICIPAL INFORMATION SYSTEM RESEARCH PROJECT

Performing Organization:	Urban Information Systems Inter-Agency Committee	Monitoring Agency:	HUD (USAC)
Principal Investigator:	Dr. William Mitchel	Project No.	99-7-13181

Objectives and Procedures: This project is designed to develop methods and techniques by which local governments can improve their decisions, operations, ability to plan, and to measure community needs and accomplishments. Currently it involves the detailed study of municipal operations and their information content, plans for effective use of computer technology, and the development and implementation of computer-driven data processing systems. It is intended that the methods used provide maximum potential for transfer of the systems to other municipalities through appropriate central systems design, development, documentation, dissemination, and implementation. It is intended, further, to encourage the use of these systems on a metropolitan or regional basis.

The Urban Information Systems Inter-Agency Committee (USAC) is sponsoring this effort to produce prototype operational computer-based municipal information systems.

USAC is an interagency body representing the Departments of Commerce; Defense; Health, Education, and Welfare; Housing and Urban Development; Justice; Labor; and Transportation; The National Science Foundation; the Office of Economic Opportunity; and the Office of Management and Budget. HUD is the lead agency for this effort and is providing the major part of the funding. This is the first effort to be approved by the Office of Management and Budget under the new Federal joint agency simplified funding procedures.

Following a competititve selection process in March 1970, HUD contracted with six municipalities for the development of two total or integrated information systems and one system each in the areas of human resources development, physical and economic development, public finance, and public safety. The research and development is being conducted by the cities of Wichita Falls, Texas; Charlotte, North Carolina; St. Paul, Minnesota; Reading, Pennsylvania; Dayton, Ohio; and Long Beach, California.

Current Developments: The cities have completed the required systems analysis and have generated reports. These reports reflect the first instance of a complete inventory and analysis of data processing used by cities in their governmental functions. The generalized design of how the computer will be used to improve municipal operations and the delivery of services to its citizens has been completed by five cities. These and future project reports will be distributed nationally by the National Technical Information Service.

Status: The project is scheduled to continue for 4 years.

ECONOMIC DEVELOPMENT ACTIVITIES AND PROCESSES

INDUSTRIAL LOCATION DETERMINANTS STUDY

Performing Organizations:	Boise Cascade Center for Community Development; Consolidated Analysis Centers, Inc. (CACI); Bureau of the Census	Monitoring Agency:	EDA - Office of Economic Research and Office of Planning and Program Support

Project No. 99-7-13170

Objectives and Procedures: The general objective of the various efforts associated with this project is to provide an industrial location planning service for EDA areas and districts. This service will match industry locational requirements with area and district resources and capabilities through the use of computer programs.

This project is proceeding on several fronts. Profiles of districts, areas, and growth communities are being prepared through the cooperation of community leaders and district staff and the efforts of CACI and EDA staff. Information being collected and compiled by the Bureau of the Census on the characteristics of existing plants and on a company's locational preferences for new facilities, will provide the basic data for the development of some 250 manufacturing industry profiles. These profiles will be at the 5-digit SIC level.

Current Developments: Nearly two-thirds of the community profiles have been entered into the community data file, and a like number of computer printout reports have been produced by CACI.

The Bureau of the Census has completed its mailings of over 9,000 questionnaires to selected business firms. Early returns indicate a high level of cooperation from the business community. The tabulation and subsequent analysis of this information will be available within 6 to 8 months.

In a separate but related industrial planning effort, Boise Cascade has completed reports on 17 urban-oriented industries and businesses. These reports, Urban Business Profiles, which were developed in cooperation with the Office of Minority Business Enterprise, are designed to provide background information for prospective minority-group entrepreneurs.

Status: The overall project is expected to be completed in the last half of 1972.

ANALYSIS OF ENVIRONMENTAL IMPACT OF ECONOMIC DEVELOPMENT IN THE COLORADO RIVER BASIN

Performing Organization:	University of Colorado	Monitoring Agency:	EDA - Office of Economic Research
Principal Investigator:	Bernard Udis	Project No.	99-7-13215

Objectives and Procedures: This study will utilize existing input-output models for 1960 for six sub-basins of the Colorado River to develop a model for testing the environmental implications of economic development in the region. Measures of the amount of air and water pollution produced by the various industries in each sub-basin and of the patterns of dispersion of these pollutants throughout the region will be wedded to the corresponding input-output tables in order to obtain the spatial configuration of pollution concentration corresponding to any combination and level of industrial activity in the region. The cost of altering any particular spatial configuration by utilizing various methods of transforming and transporting waste can be computed by adding these corrective types of technology to the model. Data on the creation of pollution will be obtained largely from the Environment Protection Agency rather than by interviewing individual firms.

Current Developments: The original input-output tables are being updated to take account of new industries or new methods of production by industries in the State and of industries that have moved from the State since 1960. Models of the process of diffusion of air pollution are being developed for inclusion in the overall study model. A number of existing hydrologic models have been examined as candidates for incorporation in the overall study model to provide information on water borne pollution. One of these has been selected, but it specifically applies only to the Upper Colorado Basin.

Work is continuing on data collection and model construction. The lack of a hydrologic model for the Lower Colorado Basin may limit the analysis of water pollution to the Upper Colorado Basin unless further investigation finds compatibility of the existing model to conditions in the Lower Basin.

Status: The project appears to be on schedule for completion by June 1972.

GROWTH AND LABOR CHARACTERISTICS OF MANUFACTURING INDUSTRIES

Performing Organization:	Economic Associates	Monitoring Agency:	EDA - Office of Economic Research
		Project No.	99-7-13200

Objectives and Procedures: This project updates a previous study designed as a technical handbook and research aid for those working in the industrial development field. Specifically, the handbook lists manufacturing industries ranked by recent value of shipments and other growth trends and provides supporting information on labor characteristics. Its purpose is to provide a starting point for individuals and agencies in their efforts to locate and attract new industry to redevelopment areas.

While the study responds to a wide variety of questions, the following probably represent those of greatest interest to economic development officials:

- Which industries have shown growth in the past and therefore might present industrial development opportunities?
- Which industries are declining, or have shrunk substantially from previous peaks, and therefore may be troubled by excess capacity?
- Within a particular industrial category, which subindustries have the greatest, or least, growth potential?
- How does a particular industry rank in its investment requirements?
- Which industries are likely to place greatest emphasis on low wage labor? On an abundance of production workers?
- What is the size of a given industry (or product class) as represented by value of shipments?

The substance of the study is presented in three tables with attendant explanations.

Status: The report has been completed by Economic Associates and is now being printed by the Office of Public Affairs. Expected date of publication - early 1972.

THE IMPACT OF POPULATION LOSS ON LOCAL GOVERNMENT FINANCES IN WEST VIRGINIA

Performing Organization:	Regional Research Institute, West Virginia University	Monitoring Agency:	EDA - Office of Economic Research
Principal Investigator:	John L. Mikesell	Project No.	99-7-13217

Objectives and Procedures: The purpose of this grant is to develop a prototype study through which the general effect of population loss on local government finance may be appraised. Capital and current expenditures by government service classes and revenues by source will be examined to determine how they vary with population. The detailed fiscal analysis will be undertaken on a sample of counties, cities, and school districts. A comparison of jurisdictions that have lost and gained population will be attempted. Results of this research may provide an improved basis for intergovernment planning for the fiscal consequences of population loss, particularly with reference to the maintenance of public services for the remaining populace.

Current Developments: The selection of localities for inclusion in the study was completed during the first month of the grant. Available data resources from Federal and State data gathering agencies have been collected, and the time series examination of selected jurisdictions initiated. The significance of the West Virginia tax limitation law and the 60 percent referendum requirement within the context of this study have been considered. The latter suggests some difficulties for the use of the minimum requirements approach for estimates of final impact of population change in West Virginia. However, the investigator will initiate efforts to develop a simultaneous equation model for cross-section estimates of the selected localities as an additional tool for analyzing local government revenue and expenditure patterns.

Status: This grant has been funded through June 1972.

ROLE OF LAW AND LEGAL INSTITUTIONS IN ECONOMIC DEVELOPMENT

Performing Organization:	The University of Wisconsin	Monitoring Agency:	EDA - Office of Economic Research
Principal Investigator:	Gordon B. Baldwin	Project No.	99-7-13110

Objectives and Procedures: The objectives of this grant are to investigate (1) the legal interrelationship between units and agencies of government as they affect the implementation of economic development plans and programs; (2) tax law and related constitutional law as they affect economic development in areas of concern to EDA, with particular reference to tax subsidies, credits, writeoffs, exemptions, and other incentives; (3) natural resource and planning law and legal institutions significant to economic development in EDA areas; and (4) security transaction, commercial business association, and property transfer laws and codes as they relate to the implementation of economic development programs.

Highlights of Findings: This project was completed in August 1971 with the submission of the report, "New Directions in Regionalism: A Case Study of Inter-Governmental Relations in Northwestern Wisconsin," by C. P. Runge and W. L. Church. This report, the result of the major inquiry initiated under the grant to the University Law School, has been published in the Wisconsin Law Review, Volume 1971, Number 2.

Sundquist and Davis developed the bulk of the factual foundations for "Making Federalism Work" (a report funded by the Office of Economic Research and published by The Brookings Institution), largely by examining the intergovernmental functions and relationships in an economically and politically diverse sample of 8 States (California, Pennsylvania, Georgia, Mississippi, Kentucky, West Virginia, New Mexico, and New Hampshire). This report results from an intensive examination of Federal, State, and local (multicounty) planning and development programs as they have evolved and operate in a single State, Wisconsin.

In contrast to Sundquist's and Davis' effort to embrace the entire spectrum of government planning and coordination problems from sparsely settled rural areas to heavily populated urban agglomerations, Runge and Church address themselves only to one section of northern Wisconsin -- a rural area in which many counties qualify for EDA assistance and all of which lie within the Upper Great Lakes Regional Commission. The empirical focus is on a resource-oriented 10 county area in northwestern

Wisconsin which, because of persistent population decline and lack of income growth has lagged far behind the thriving southern portion of the State. This economic stagnation has posed perennial problems for all levels of government and has consequently led to a series of remedial socio-economic actions generated by both Federal and State governments.

The major conclusions are:

- The Appalachian Regional Commission, the Title V Regional Commissions, and the river basin planning commissions should be phased out. Their planning and coordination efforts would be assumed by new multistate regional structures that would encompass all the States.

  This suggested construct would enhance the political power of the several State governors, at the expense perhaps of Cabinet officers and United States Senators and Representatives. The Governors would gain the strength of a formal regional forum, as distinguished from the relatively ineffective present conferences among State Governors

  A strong regional structure is predicated upon close staff linkage between the region and the Office of the President. The reorganization of the Bureau of the Budget into the Office of Management and Budget might well pave the way for the assumption of central planning functions and additional interagency program coordination responsibilities in that office.

- Development programs and environmental quality programs must be related. A public policy of economic development which is related to a natural resource base should be planned and administered with careful attention to the impact of such development on other public policy objectives, including environmental protection and social quality.

- Comprehensive multicounty regional commissions should be considerably strengthened, both in capacity and in authority. They should also relate to a single, strengthened central State planning and review council and planning office. In this way, and only in this way, can local and State needs and priorities be systematically prescribed for guiding local, State and Federal programs.

In submitting this report the authors note that Governor Lucey has appointed a Citizens Commission headed by former Governor Knowles, which involves several members of the university staff, to consider substantive and institutional land resource problems. The central aim of the Commission is to seek devices at the multicounty, State and multistate levels that will effectively deliver governmental services to the people and minor units of government throughout the scale.

Other reports or studies developed under this grant include the following:

- "Federal Withdrawals from the Public Domain, Alaska," by Mary Ellen Brown. Law School M.S. Dissertation, unpublished. This report was developed in part to close a void in information about withdrawal procedures practiced by agencies responsible for managing Federal lands. The report augments the report of the Interior Department's Land Law Review Commission.

- "The Economic Impact of Laws and Regulations Pertaining to the Forest Industry in Alaska," by George R. Campbell, Law School M.S. Dissertation, unpublished, also used by the Land Law Review Commission.

- "Natural Resource Protection Through Shoreline Regulation: Wisconsin," by D. A. Yanggen and Jon A. Kusler, Land Economics, Volume XLIV, No. 1, 1968, p. 73. This paper embraces the substance of Dr. Kusler's Ph.D. dissertation granted in a unique multidisciplinary program undertaken jointly by the University Departments of Geology and Economics and the Law School.

- Partial support was given in 1968 to a survey of planning commissions in Wisconsin by Visiting Professor of Law, Sheldon J. Plager. This survey was undertaken as part of Mr. Plager's nationwide study of State codes delegating to local governments the authority to enact zoning laws governing use of land and the degree to which the codes require that zoning laws be based upon approved land use plans.

In addition to support for the graduate law school students, the staff initiated two graduate seminars that feature the relationship between legal processes and procedures and development of economic resources.

One of these multidisciplinary seminars, entitled "Law, Technology and Society," features a study of technologically induced environmental problems in the Madison area. These seminars are being continued by the Law School.

Since the termination of the grant, Mr. Runge, professor of law at the University and senior author of "New Directions in Federalism," has been appointed chairman of the Department of Urban and Regional Planning, and a number of faculty members have become active on the Citizens Committee appointed by the Governor to advise on management of the State's land resources. These enlarged staff activities, are to a substantial degree, traceable to work performed relating legal matters to economic development.

Status: The project was completed in August 1971.

SUBNATIONAL IMPACT OF NATIONAL ECONOMIC POLICY

ECONOMIC COSTS OF SPATIAL ALTERNATIVES IN GROWTH

Performing Organization:	The University of Chicago Center for Urban Studies	Monitoring Agency:	EDA - Office of Economic Research
Principal Investigator:	George S. Tolley	Project No.	99-7-13221

Objectives and Procedures: This research effort is a theoretical and empirical economic analysis of the costs and benefits of alternative spatial patterns of economic and population changes. The study is related to the expressed needs of the Federal Administration to formulate a national growth policy. Areas of research that will be considered include: the fostering of growth of low income lagging regions; curbing of growth of large cities insofar as they become uneconomic and sites of social ills due to their size and density; the spreading out of economic activities to reduce environmental damage; and the preservation of the advantages of small town life.

Current Developments: A study has been received recently that demonstrates how economic analysis can be used more fully to evaluate population distribution policy questions. After dealing briefly with the rationale for the existence of cities of varying size, the inquiry considers possible reasons for attempting to influence where people live. The reasons considered are market and institutional externalities, nonpriced goods and national public goods. A quantitative approach to the evaluation of policies is suggested and illustrated with numerical examples that suggest how to evaluate efforts to disperse economic activities to areas outside the Nation's larger cities.

Status: Studies in the above areas are expected to be completed by June 1972.

RESEARCH ON FEDERAL TAX EXPENDITURE AND TRANSFER SUBSTITUTIONS

Performing Organization:	National Bureau of Economic Research, Inc.	Monitoring Agency:	EDA - Office of Economic Research
Principal Investigator:	Steven Dresch	Project No.	99-7-13179

Objectives and Procedures: This research is intended to provide an integrated and comprehensive analysis of the redistributive effects, both spatially and on a per capita basis, of alternative fiscal relationships among Federal, State, and local governments. These include general and special revenue sharing, the proposed family assistance plan, and federalization of welfare programs.

Income redistributions implied by a combination of benefit and cost aspects of a program would be projected and analyzed. For example, the redistribution of Federal grants implied by a substitution of revenue sharing for existing categorical grants would be predicted and examined. In this way the analysis would focus on the combined incidence of a complete menu of change rather than on the individual incidence of any single component of change, e.g., revenue sharing by itself. By identifying the full range of policy change in this way it will be possible to characterize adequately the implications of any proposed program.

Geographically, the initial studies would focus on the State level, with concentration on the Southeast as compared to other parts of the country. Because the intrastate distribution of benefits might be very different than would be expected on the basis of interstate differentials alone, efforts will be made to allocate benefits within States by income class and other relevant population characteristics. This necessitates a further analysis of State and local governmental fiscal responses to the Federal program substitutions. At this stage the research will also focus on substate areas, with analysis at the county level.

In addition to interim reports on particular parts of the research, a final summary report will be provided.

Specifically, the expected products of this grant are as follows:

1. Papers describing the results of preliminary analysis of the implications of special and general revenue sharing, separately and combined.

2. Papers describing the implications of alternative financing assumptions and detailing the intrastate implications of special and general revenue sharing. The county would likely be the unit of analysis with some aggregations to urban, rural, and individual State levels.

3. Extension of the papers under No. 2 above to examine the probable per capita income redistributive effects of the revenue sharing programs.

4. A series of papers analyzing the implications of alternative program substitutions (family assistance plan, Federal assumption of welfare costs, etc.) would be released, probably beginning in early 1972 and continuing beyond the current project period. State and local fiscal responses to these programs would also be traced out.

This research will ultimately result in two published volumes, one providing a comprehensive analysis of the specific programs studied and a second dealing with the general analysis of Federal policy alternatives. However, these would not be expected to be completed within the initial project period.

Current Developments: During the first phase of this grant, major effort was devoted to: (1) searching, examining, and acquiring pertinent data sources; (2) gathering and ordering the special legislation concerning the distribution of categorical grants at the State level; (3) initial exploration of the intrastate distribution of general revenue sharing; and (4) the preparation of a paper exploring a system of progressive credits of State-local taxes against Federal income taxes. The latter paper, "Federalism, Tax-Transfer Substitutions and the Distribution of Income with an Appendix on Progressive Tax Credits," was presented to a symposium on "Fiscal Centralization and Federalism" at the 64th Annual Conference on Taxation, National Tax Association, Kansas City, September 27, 1971. The credit would be a declining function of the taxpayer's average Federal income tax liability; any excess of the credit over the Federal tax liability would be remitted to the taxpayer. In contrast to Federal deductibility, which makes the effective credit rate a function of the individual's marginal tax rate, i.e., higher rates yield higher credits, progressive credit rates decline as income increases. Such a system might result in making the relative price of public services low to individuals living in low income areas.

Status: A summary report is expected in the summer of 1972.

INCOME SUPPLEMENTS AND REGIONAL ECONOMIC DEVELOPMENT

Performing Organization:	The Rand Corporation	Monitoring Agency:	EDA - Office of Economic Research
Principal Investigator:	T. Paul Schultz	Project No.	99-7-13220

Objectives and Procedures: The primary purpose of this grant is to develop a theoretical and statistical framework within which subsequent empirical analyses of the relationships between nationwide, Federally supported income supplements and regional economic development may be conducted. Its impetus arises from the recognition that a national program of income supplements, such as the family assistance plan, would have regionally differentiated impacts. This is an initial exploration of the problems inherent in appraising these impacts. The transfer payments themselves may be a significant factor altering existing patterns and practices for various population groups in different geographic areas. Attention will be focused upon those decision-making areas -- migration and labor supply response and consumption expenditures -- which might alter the initial regional income effects.

Current Developments: During the first few months of this grant, major effort has been devoted to organizing the work into five areas: (1) labor supply behavior of primary family workers; (2) labor supply behavior of secondary workers; (3) migration; (4) savings and consumption behavior; and (5) inter-regional interaction effects. Work has proceeded on formulating a consistent set of concepts appropriate to each of the areas, and preparing working files from the Survey of Economic Opportunity for 1966 and 1967 to be used as a basis for testing, confirming, and/or rejecting alternative analytical frameworks. Additional efforts have gone toward developing a strategy for the labor supply response models and exploring a strategy for a migration behavior model. A week-long seminar with Glen Cain (University of Wisconsin) was devoted to analyzing different approaches to the labor supply response models in order to provide critical reviews that could lead to a model formulation to be tested for this project. The migration analysis is proceeding through the development of a model for family and individual decision-making, providing detailed age, race, sex, and schooling groups from which an attempt to integrate information on individual adults into family models will be undertaken. A focus of interest is the background support of both income and asset level in the migration decision as a clue to the impact of income

supplements on migration decision-making. In addition, a week-long consultation with Marc Nerlove (University of Chicago) was devoted to analyzing methodological difficulties, including simultaneous equations specification problems, the estimation of cross-section relations from time series data, and the use of instrumental variables within the proposed models.

Status: This grant was funded through June 1972.

EMPLOYMENT EFFECTS OF PLANT EXPANSIONS AND ACCELERATED PUBLIC WORKS IN RURAL REDEVELOPMENT AREAS

Performing Organization:	The University of Wisconsin	Monitoring Agency:	EDA - Office of Economic Research
Principal Investigator:	Gerald G. Somers	Project No.	Contract C-331-65(neg)

Objectives and Procedures: This project compares the characteristics, employment, and earnings experiences of three groups of workers in the somewhat depressed counties of Northern Michigan, Northern Wisconsin, and Northern Minnesota. The three groups are: (1) workers who have been employed in industrial plants which were given assistance by the Department of Commerce (ARA Sample), (2) workers who were employed in public works financed by the Department of Commerce (APW Sample), and (3) a group of workers selected from the Employment Service files in the same areas (Comparison Sample). Since a number of the workers in each of these groups had received government subsidized retraining, the study evaluates the relationship of retraining to other forms of government assistance in economically depressed areas.

Samples and methodology used were as follows:

a. (ARA Sample) workers employed in new or expanded plants which received assistance from the Department of Commerce under the Area Redevelopment Act, now replaced by the Economic Development Act;

b. (APW Sample) workers employed in Accelerated Public Works projects in connection with forest redevelopment or public construction;

c. (Comparison Sample) workers drawn from the active and inactive files of the local Employment Service offices in the same communities in which the ARA and APW samples were selected but who had not been employed in either the ARA plants or on the APW projects. A total of 1,370 interviews were conducted in the three States utilizing formal survey questionnaire instruments. Cross tabulations and multivariate regression analyses were utilized in an effort to determine the influence of differences in the characteristics and experience of the three sample groups as well as the effects on the communities in which they reside.

Findings and Conclusions: Characteristics of the Three Groups - Those employed in the new and expanding plants (ARA) enjoyed employment advantages relative to the APW and comparison groups from the standpoints of

age, education, and previous training. Many moved directly from high school to jobs in the government-aided industrial enterprises.

Effects on Employment and Income - The relatively young ARA workers substantially improved their employment and income status because of the predominance of non-labor force status (essentially high school education) prior to their ARA employment. However, older ARA employees, who had been employed in the declining mining and lumbering industries prior to their ARA employment, experienced a decline in income.

The workers employed on APW projects were divided into two groups with contrasting backgrounds and experience. Those engaged in forest development and similar public service were relatively older and had suffered chronic unemployment prior to the APW projects. Although their income was maintained through the APW work, the short term nature of these jobs returned them to a continuation of unemployment after the government projects ended. The relatively skilled workers employed on APW construction projects experienced a much more substantial increase in income and benefited from employment security of much longer duration

The employment and unemployment histories of the comparison group do not differ markedly from those who were employed in the ARA plants. However, the ARA group experienced a significantly greater increase in personal income than did the comparison group. Because of the nature of the age and family composition of the two groups, median family income increased at about the same rate for both.

Labor Mobility - There was little evidence of movement of new jobholders into the redevelopment counties as a result of the government aid and projects. The ARA workers experienced a noticeable occupational mobility from sales, clerical, and service work into operative occupations. Occupational mobility for the APW group was linked to the type of project involved, essentially a continuation of unskilled work for those in forestry projects and a continuation of relatively skilled work for those employed in construction work.

Training and Retraining - For all groups, institutional and on-the-job training was significantly and positively related to improvements in employment and income. Since government-sponsored retraining programs were designed primarily for the hard-core unemployed, a beneficial relationship between such retraining and income-employment status was less noticeable. Analysis of this relationship was hampered by the short period of followup evaluation. The amount of training experienced by the ARA and APW construction workers was somewhat similar and contrasted sharply with the training experience of the APW forestry workers.

Attitudes - The relatively young ARA employees were more optimistic about opportunities for advancement, job security, and increased income than were the APW workers. Those engaged in APW projects expressed a relatively low preference for mobility. Thus it cannot be assumed that outmigration would be a likely means for reduction of the chronic unemployment status of these counties in the rural redevelopment areas.

Effects on the Communities - The government-assisted industrial plants and public works were on too small a scale to have a significant impact in the counties in which they were located. They resulted in little return migration, and they served primarily as a temporary income maintenance program for the older chronically unemployed workers of the area. However, the APW projects furthered the environmental aspects of the communities even if they provided no long term solutions to the employment and income problems of their residents.

While the investigation succeeds to a considerable degree in illuminating significant differences between the beneficiaries of two quite dissimilar Federal efforts to cope with economic malaise, it also illustrates the severe procedural difficulties encountered in identifying the discrete samples needed to meet such an objective. The samples in this study are too small; the comparison group was drawn at a different time than the samples and is not an adequate comparison. In addition, the time frame of the interviews is too short to reflect the full extent of income change that is likely to occur as a result of substantial on-the-job training.

Status: Final Report received April 1971.

STUDENT INTERNSHIP IN ECONOMIC DEVELOPMENT

Objectives and Procedures: The objective of these grants is to give undergraduates experience in dealing with local development and planning problems through specific on-the-job work projects related to local economic development programs, thus increasing the number of practioners in the field. This is in accordance with the provisions in Title III of the Public Works and Economic Development Act that direct the Secretary of Commerce to conduct a continuing program of study, training, and research for providing needed economic development personnel.

In view of the great demand for trained personnel and the limited budgets, the grantees are directed to place special emphasis on developing self-sustaining intern training programs supported by funds budgeted by for educational purposes.

Council of State Governments
Midwestern Advisory Committee
on Higher Education (MACHE)

Monitoring Agency: EDA - Office of Economic Research

Principal Investigator: Dr. D. Jeanne Patterson

Project No. 99-7-13204

Current Developments: In its first year of operation, the program established projects in 10 of the 12 States affiliated with the Midwestern Advisory Committee on Higher Education, an advisory group sponsored by the Council of State Governments. These projects involved 49 full time summer interns drawn from 27 colleges or universities. In addition, three full time interns are scheduled for the fall quarter and seven part time interns were proposed for the December vacation break.

A tabular profile of the characteristics of the summer interns, the host agencies and subject of the investigation indicates that the bulk of the interns were male (80%), undergraduates (60%), between 21 and 25 years of age (66%). Twenty-five of the host agencies were EDD's or EDA designated counties and 15 were State agencies. Nearly half (23) of subjects of inquiry dealt with local economic development problems with the re-

mainder widely distributed over such diverse subjects as environment, education, tax analysis, welfare, library planning, etc. (Most of the participating educational institutions are State supported, although four interns were recruited from nonmidwestern universities: Pittsburgh, Georgetown, Harvard, and Cornell.

The project succeeded in establishing 59 full time and part time interns as opposed to the 25 to 30 indicated in the original plan. This is due in large part to success in inducing other local and State agencies to contribute support. This outside contribution, which is estimated to total $87,210 in cash and in-kind was particularly important in four States: North and South Dakota, Missouri, and Ohio. In the latter two States the bulk of the additional support comes from funds provided from the Ozark and Appalachian Regional Commission budgets.

Only limited success was achieved with respect to involvement of minority groups. Only one summer intern was black. However, all of the six part time interns are black. They will work on planning budget problems in two black incorporated communities in the suburbs of Chicago.

Plans for the 1972 program will continue to stress decentralization and expansion of local support with special emphasis upon enlarging the involvement of the Regional Commissions and additional statewide agencies. South Dakota proposes a 1972 program that will be fully State supported.

Status: This project is funded through December 1971. A proposal is being processed which will continue the project through December 1972.

New England Board of Higher Education (NEBHE)		Monitoring Agency:	EDA - Office of Economic Research
Principal Investigator:	Norman Stein	Project No.	99-7-13210

Current Developments: EDA extended the Student Intern Training Project to the Northeastern States in 1971 by providing a small grant to the NEBHE. This grant was a supplement to funds advanced by the New England Regional Commission in 1970 and 1971 for the purpose of supporting interns in the six New England States. The EDA grant enabled the NEBHE staff to initiate five major projects involving 12 interns with development agencies and educational institutions in New York State. The identification and execution of all projects, including the several in New England, were materially assisted by the local Economic Development Representatives.

The New York State projects were:

For Brooklyn Labor Economic Development Corporation (BLEDCO), two interns, under supervision of Columbia University Graduate School of Management, developed, tested and carried out an inventory of black owned enterprises in the BLIEDCO; area of operations. A group of 15 Urban Corps teenagers was trained to implement the survey.

For the city of Cohoes, New York, two interns under supervision of the School of Management, Rensselaer Polytechnic Institute, did two studies: a scheduling procedure and cost finding analysis for the Cohoes Department of Public Works and development of a comprehensive Model City budget.

For Tompkins County, four interns aided by the staff of Cornell University carried out two surveys: (1) an Ithaca-wide social attitude inventory on behalf of Tomco Better Housing, Inc., and (2) a profile of the county job market for youths, ages 14-17, for the County Economic Opportunity Corporation. The latter was developed by a team of three interns.

For the St. Lawrence County Planning Commission two interns advised by the Staff of Clarkson College of Technology developed a comprehensive survey of attitudes and practices relating to solid waste disposal. This included a computer program to handle 2,000 to 3,000 questionnaires.

For the Champlain Development Corporation, two interns under supervision of SUNY Plattsburgh, carried out a labor survey of some 5,000 respondents and developed the computer program to analyze results.

While NEBHE initially stressed multi-intern projects involving a limited number of host agencies and education institutions as a timesaver, the emphasis on "group" practice has also enhanced interest on the part of the educators for projects extending throughout the school year and for the development of supporting curriculums designed specifically to train groups of students for careers in the area of public service.

In FY-1972 additional funds will be provided to extend the program into the other Middle Atlantic States.

Status: This project is funded through January 1972. A proposal is being developed to continue the project through December 1972 and to provide additional funds needed to extend the project to other Middle Atlantic States.

Southern Regional Education Board (SREB)	Monitoring Agency:	EDA - Office of Economic Research
Principal Investigator: Peter Meyer	Project No.	99-7-13109.5

Current Developments: In the sixth year of operations this project continued to emphasis the decentralization pattern started in 1969, and only seven internships were managed directly by SREB. The on-going state or locally operated programs were in North Carolina, South Carolina, Virginia, Georgia (Savannah) and Louisiana (New Orleans). Each program was given modest financial support by SREB and in turn, each identified a specific number of interns as SREB-EDA interns. Under this arrangement, there were 29 interns in these on-going programs.

In addition, two new statewide programs were started. The Governor's Office in Georgia, with the aid of $1,800 from SREB-EDA and one SREB staff member working half time for 4 months, established a statewide program involving 140 interns, of which 12 were "assigned" to SREB-EDA.

Texas began a statewide service learning program with 26 interns with no SREB funds. This was a significant breakthrough in that all financial support came from a contract negotiated by the State with a private foundation. Twelve of these interns were "assigned" to SREB-EDA. Both of these new programs are committed to substantial expansion in 1972, and Georgia has hired the SREB staff person full time to operate its program.

In toto, 56 interns were identified as SREB-EDA interns in 1971. This exceeded by 21 the estimate of number of interns in the original grant proposal.

Status: The project is funded through December 1971, and a proposal to extend assistance through 1972 is being processed. This new grant will continue existing State projects and stress development of new or expanded statewide projects in Arkansas, Maryland, West Virginia, and Tennessee.

Western Interstate Commission for Higher Education (WICHE)

Monitoring Agency: EDA - Office of Economic Research

Principal Investigator: Robert S. Hullinghorst

Project No. 99-7-13155.4

Current Developments: In 1971, the third year of operation, 86 interns were placed in 11 States as follows: Colorado (37), Oregon (13), Montana (11), New Mexico (6), California and Nevada (5 each), Washington (3), Alaska and Hawaii (2 each), and Arizona and Wyoming (1 each).

These interns were assigned to 54 different host agencies scaled in size from those with multistate regional interests down to local municipalities. Interns were assigned to these various host organizations as follows: Multistate regional (4), State (25), district or other julti-county (14), county (10), municipality (22) and other (10). "Other" are in the main educational institutions.

There was a substantial increase in the number of interns in Colorado. This was the outgrowth of an arrangement by WICHE to transfer the administrative and development costs of organizing intern projects to four state educational institutions. This arrangement for cost-sharing is the initial step in ultimately organizing a self-sustaining intern training program at the State level.

As in 1970, long range planning studies in such diverse fields as land use, natural resource surveys, transportation, recreation, manpower requirements, and industrial site surveys were prominent among the categories of inquiry. Even in Colorada and Oregon, where substantial support was obtained from State and local sources, these topics were predominant. In addition, several interns were assigned topics designed to help broaden the intern program, and others examined procedures for project evaluation. Both of these developments indicate an aroused interest on the part of educators in adopting the service-learning experiences as integral to the higher education processes.

Status: This proposal is funded through April 1972. A proposal is being processed which will continue the activity into 1973.

EDA RESEARCH REPORTS

EDA research studies prepared under contract to the Economic Development Administration are now available from the Commerce Department's National Technical Information Service. These reports are available at the following prices:

300 pages or less	3.00 per copy
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